Environmental Assessment/Regulatory Impact Review/Regulatory Flexibility Analysis

For

A Program to Monitor Time-Area Closures in the Pacific Coast Groundfish Fishery

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1.0 INTRODUCTION

The groundfish fishery in the Exclusive Economic Zone (EEZ), 3 to 200 miles off shore, off the Washington-Oregon-California (WOC) coast is managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). The Pacific Coast Groundfish FMP was prepared by the Pacific Fishery Management Council (Council) under the authority of the Magnuson Fishery Conservation and Management Act (subsequently amended and renamed the Magnuson-Stevens Fishery Conservation and Management Act). The Pacific Coast Groundfish FMP was approved by the Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration, on January 4, 1982 and became effective on September 30, 1982.

Actions taken to amend FMPs or to implement regulations to govern the groundfish fishery must meet the requirements of several federal laws, regulations, and executive orders . In addition to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), these federal laws, regulations, and executive orders include the: National Environmental Policy Act (NEPA), Regulatory Flexibility Act (RFA), Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), Coastal Zone Management Act (CZMA), Paperwork Reduction Act (PRA), Executive Orders (E.O.) 12866,12898, 13132, and 13175, and the Migratory Bird Treaty Act.

The regulations which implement NEPA permit NEPA documents to be combined with other agency documents to reduce duplication and paperwork (40 CFR§§1506.4). NEPA, E.O. 12866 and the RFA require a description of the purpose and need for the proposed action as well as a description of alternative actions that may address the problem. The purpose and need and general background materials are included in Section 1 of this document. Section 2 describes a reasonable range of alternative management actions that may be taken under the proposed action. In accordance with NEPA requirements, Section 3 contains a description of the physical, biological and socio-economic characteristics of the affected environment. Section 4 examines the physical, biological and socio-economic impacts of the management options as required by NEPA, E.O. 12866 and the RFA. Section 5 addresses the consistency of the proposed actions with the FMP, Magnuson-Stevens Act, ESA, MPA, CZMA, PRA, E.O. 12866, E.O. 13175 and the Migratory Bird Treaty Act. The Regulatory Impact Review required by E.O. 12866 to address the economic significance of the action, and the Regulatory Flexibility Analysis required by the RFA to addresses the impacts of the proposed actions on small businesses are found in Section 6. Sections 7 presents a list of individuals who assisted in preparing the EA and Section 8 is the list of references. The NEPA conclusions or the Finding of No Significant Impact has been prepared as a memorandum that accompanies this document.

1.1 Proposed Action

The proposed action is to require vessels registered to limited entry permits for the Pacific Coast groundfish fishery to carry and use mobile Vessel Monitoring System (VMS) transceiver units while fishing in state and federal waters off the coasts of Washington, Oregon and California. In addition, the proposed action requires the operator of any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear, including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, to identify the intent to fish within a conservation area specific to the gear type, in a manner that is consistent with the conservation area requirements. This action will enhance monitoring of compliance with large-scale depth-based restrictions for fishing across much of the continental shelf and is intended to further the conservation goals and objectives of the Pacific Coast Groundfish Fishery Management Plan (FMP) by allowing fishing to continue in areas and with gears that can harvest healthy stocks with little incidental catch of low abundance species (overfished species).

1.2 Background

It is the responsibility of fisheries management to maintain sustainable fisheries by: establishing sustainable catch levels; developing fishery specifications and management measures (regulations); monitoring and overseeing fishery harvests; and enforcing fishery regulations and prosecuting those who engage in illegal activities.

Fishing fleets are routinely monitored to ensure that vessel operators comply with fisheries regulations. Traditional monitoring techniques include the monitoring of fisheries from air and surface craft, observer programs, and analysis of catch records and vessel logbooks. Because VMS can be used to deter illegal activity, target investigations, and direct patrols, the efficiency of traditional monitoring techniques can be dramatically enhanced by the addition of VMS. VMS is a tool that is commonly used to monitor vessel activity in relationship to geographical defined management areas where fishing activity is restricted. VMS transceivers installed aboard vessels automatically determine the vessel's location and transmit that position to a processing center via a communication satellite. At the processing center, the information is validated and analyzed before being disseminated for fisheries management, surveillance, and enforcement purposes. VMS transceivers document the vessel's position using Global Positioning System (GPS) satellites. Depending on the defined need, position transmissions can be made on a predetermined schedule or upon request from the processing center. VMS transceivers are designed to be tamper resistant. The vessel operator is unable to alter the signal or the time of transmission and in most cases the vessel operator is unaware of exactly when the unit is transmitting the vessel's position. Figure 1.1 illustrates the flow of information from a VMS system.

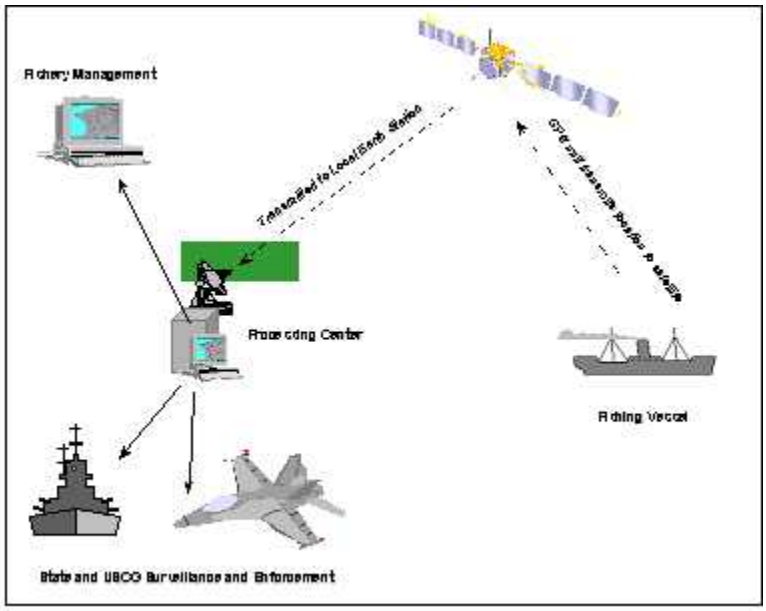


Figure 1.1 Example VMS Scenario

On September 23, 1993, NMFS published proposed VMS standards at 58 FR 49285. On March 31, 1994, NMFS published final VMS standards at 59 FR 151180. These notices stated that NMFS endorses the use of VMS and defined specific criteria for using VMS (see Appendix A) as a fishery management tool. On September 8, 1998, NOAA published a request for information (RFI) in the Commerce Business Daily in which it stated minimum VMS specifications necessary for approval by NOAA. The RFI requested that responses from interested VMS providers include supporting information which would demonstrate that the VMS could meet the minimum specifications established by the NOAA Office for Law Enforcement (OLE).

NMFS requires that VMS systems meet the defined standards to assure compatibility with the national monitoring center, while recognizing the need to promulgate regulations and approve systems on a fishery-by-fishery basis. All approved units must be consistent with the basic features identified and

endorsed by NMFS, however, additional features may be added to better meet the specific needs of a particular fishery. VMS transceiver units approved by NMFS are referred to as type-approved.

The following are NMFS's minimum specifications for VMS systems used for fishery management and enforcement purposes:

- the VMS unit must be tamper proof such that it does not permit the input of false positions;
- the equipment must be fully automatic and operable at all times;
- the VMS unit must be accurate to within 400 m (1,300 feet) and capable of tracking a vessel throughout the entire geographical area where the management measures apply;
- the VMS unit must be capable of transmitting and storing information such as vessel identification, date, time, latitude, longitude, speed and bearing;
- the VMS unit must provide accurate position transmissions;
- the VMS unit must allow position transmissions to be set or changed remotely and allow NMFS to poll vessels (to freely query a vessel's transmitter for a position); and.
- under certain conditions, the VMS units may be required to provide two-way message communications between the ship and shore (one-way communication only allows the vessel to transmit positions from the ship to shore). Such communications would include, but not be limited to transmitting and receiving full or compressed data messages.

Amendment 13 to the Pacific Coast Groundfish FMP recognized the value of VMS in enforcing closed areas that are established to reduce bycatch levels. Amendment 13 also identified VMS as a technological tool that could be used to improve bycatch management by providing fishing location data that can be used in conjunction with observer data collections.

In addition , There were several issues that emerged during the development of the depth-based management regime adopted for 2003 fishery. One such issue was the use of a VMS monitoring program to track the movement of vessels through and within the depth-based conservation areas.

1.3 Purpose and need for action

Time and area closures have long been used to restrict fishing activity in the Pacific Coast groundfish fishery to keep harvests within sector allocations, at sustainable levels, or to prohibit the catch of certain species. Until September 2002, geographically defined areas tended to be nearshore or defined by a simple longitude and latitude lines. On September 13, 2002, NMFS took emergency action to establish depth-based management measures (67 FR 57973). The emergency rule restricted trawling north of 40°10' N. lat., in the months of September though December 2002, to depths where darkblotched rockfish was not expected to be encountered. These measures were taken to reduce the incidental catch of darkblotched rockfish, in order to keep total catch below the 2002 Optimum Yield (OY) level. The depth-based area, referred to as the Darkblotched Rockfish Conservation Area, was based on bottom depth ranges where darkblotched rockfish commonly occur (100-250 fm) and used a series of latitudinal and longitudinal coordinates to define a large irregularly shaped geographical area that extends far offshore. This resulted in much of the fishing activity being moved far offshore and beyond the range of state enforcement capabilities.

For 2003, the Council sought a management strategy that would allow fishing to continue in areas and with gear that can harvest healthy stocks with little incidental catch of low abundance species (overfished species). Recent stock assessments for four overfished species, bocaccio, yelloweye, canary and darkblotched rockfish, indicated that little surplus production is available for harvest. Measures must be taken to protect these stocks and rebuild them to sustainable biomass levels. Therefore, the Council recommended that NMFS define additional management areas for the groundfish fishery that are based

on bottom depth ranges where these low abundance species are commonly found. For 2003, large-scale depth-based areas, referred to as groundfish conservation areas, have been used to prohibit or restrict both commercial and recreational fishing across much of the continental shelf. Deep-water fisheries on the slope and nearshore fisheries are be permitted, in areas seaward or shoreward of the depth-based conservation areas.

The boundaries of the groundfish conservation areas are complex, involving hundreds of points of latitude and longitude to delineate nearshore and offshore fathom curves. The areas are vast, extending along the entire West Coast from Canada to Mexico, and the weather and sea conditions are frequently harsh. Some fishing, such as midwater trawling for pelagic species, shrimp trawling with finfish excluders and various state-managed fisheries, has been allowed to occur in the conservation areas. In addition, vessels intending to fish seaward of the westernmost boundary of a conservation area allowed to transit through the areas providing the gear is properly stowed.

Ensuring the integrity of conservation areas using traditional enforcement methods (such as aerial surveillance, boarding at sea via patrol boats, landing inspections and documentary investigation) are especially difficult when the closed areas are large-scale and the lines defining the areas are irregular. Furthermore, when management measures allow some gear types and target fishing in all or a portion of the conservation area, while other fishing activities are prohibited, it is difficult and costly to effectively enforce closures using traditional methods. Scarce state and Federal resources also limit the use of traditional enforcement methods. To allow for a more liberal depth-based management regime, as proposed by the Council for 2003, it was necessary to take action to establish a monitoring program to ensure the integrity of these large irregularly shaped depth-based conservation areas. This action is intended to create a monitoring program that will promote compliance with regulations that prohibit some fishing activities in conservation areas while allowing legal fishing activity that occurs within conservation areas to be effectively monitored. One of the major benefits of VMS is its deterrent effect. If fishing vessel operators know that they are being monitored and that a credible enforcement action will result, then the likelihood of a vessel using a prohibited gear in a conservation area is significantly diminished. The purpose of this Environmental Assessment (EA) is to analyze components of a program that can be used to monitor groundfish conservation areas.

1.4 Scoping Process

The purpose of the scoping process is to determine the range of issues that the NEPA document (in this case the EA) needs to address. This allows the preparation of the document to be effectively managed. Scoping is intended to ensure that problems are identified early and properly reviewed, that issues of little significance do not consume time and effort and that the draft NEPA document is thorough and balanced. The scoping process should identify the public and agency concerns; clearly define the environmental issues and alternatives to be examined in the NEPA document including the elimination of nonsignificant issues; identify related issues; and identify state and local agency requirements that must be addressed. An effective scoping process can help reduce unnecessary paperwork and time delays in preparing and processing the NEPA document.

On June 3-4, 2002 the Council's Allocation Committee met to discuss the development of management measures for the 2003 groundfish fishery. At this public meeting, representatives from NMFS OLE provided information on VMS technology and different monitoring options that could be implemented to support compliance with depth-based management measures. The cost of such systems and who would bear those costs were key issues during the Allocation Committee's discussions. The public was invited to comments upon and discuss the monitoring needs of the Pacific Coast groundfish fishery in relation to management measures proposed for 2003. During the discussion, consideration was given to: the timeliness of VMS position reports, geographical areas proposed to be monitored; the size and class of vessels that may be monitored; the level of communications with the vessels needed while they are at sea; safety concerns; and ways to address transiting of closed areas. Following this discussion, the Allocation Committee recommended that the Council consider using risk-adverse measures such as VMS or observers to monitor fisheries that are most likely to encounter bocaccio, yelloweye or canary rockfish. These are the

three most constraining species in 2003 in that they limit the availability of fishing opportunities on healthy stocks..

At its June 2002 meeting, the Council reviewed VMS recommendations from the Allocation Committee and Enforcement Consultants. Because of its cost effectiveness, the Enforcement Consultants recommended that VMS be considered as a monitoring tool for closed areas. The Enforcement Consultants prepared a worksheet that identified VMS issues, system specifications, and listed VMS questions that the Council would need to consider if it chose to use VMS as a monitoring tool. These documents and committee reports were made available to the public and the public was invited to provide comment to the Council. Following Council discussion, the Council recommended forming a committee that included enforcement representatives, industry members, and biologists to review the questionnaire and provide further direction to the Council on VMS development.

On July 16, 2002 , enforcement representatives met to discuss VMS and refine a VMS proposal. VMS equipment requirements, approximate fleet sizes by fishing sectors likely to be considered for VMS units, and estimated costs associated with purchase, installation, and operation of VMS units were identified. The Allocation Committee held a public meeting on August 28-29, 2002 in which enforcement representatives were present and VMS and observers were discussed as methods of monitoring the 2003 fishery. This was a public meeting in which public input was invited. A summary report of these meetings was presented and made available for public review at the Council's September 2002 meeting. The Council's Groundfish Advisory Sub-panel discussed the concept of a VMS monitoring system and identified the following issues: 1) need to establish a VMS committee to help NMFS design and implement VMS program; 2) program should begin by requiring only a small portion of the fleet to carry VMS; 3) equipment manufactures need to meet with fishermen to address technical questions; 4) the need to recognize diversity within the fleet when implementing a program; and 5) the federal government should provide transceiver units. After reviewing the information provided by its advisory committees and the public, the Council recognized that a VMS program would be beneficial to the management of the groundfish fishery, specifically, in maintaining the integrity of new, depth-based management measures. The Council requested that NMFS further analyze a VMS program, develop implementing regulations, and create a VMS committee composed of enforcement and industry representatives to work with NMFS on development of a monitoring program.

On October 11,2002, the Council's VMS committee held a public meeting in Portland, Oregon and identified the goals and objectives of a monitoring program; identified desirable characteristics of a declaration reporting system; examined VMS coverage options, including priorities in coverage; and VMS unit costs and cost sharing. At the Council's November meeting, a VMS committee report was made available to the Council, its advisory bodies, and the public. At this same meeting, the Council recommended that NMFS move forward with a proposed rule to implement a VMS program for the Pacific Coast groundfish fishery in 2003 and identified its preferred alternatives.

On December 18, 2002, the Council's VMS committee held a public meeting in Portland Oregon. During this meeting the committee reviewed a draft rule that would implement a VMS program and declaration requirements.

2.0 ALTERNATIVE MANAGEMENT ACTIONS

Table 2.0.1 Summary of Alternative Management Actions for Monitoring Time-area Closures in the Pacific Coast Groundfish Fishery

ISSUE 1: The Monitoring System	**Alternative 1** **Status quo**	**Alternative 2** Declaration reports - from limited entry trawl and fixed gear vessels, and all other commercial and tribal trawl vessels including exempted trawl gears that intend to fish within a conservation area defined for their gear type.		**Alternative 3** Basic VMS system with one way communications; declaration reports as described under Alternative 2; VMS operated continuously in State and federal waters regardless of fishery. (NMFS preferred)	**Alternative 4** Upgraded VMS system with 2-way communications; declaration reports as described under Alternative 2; VMS operated continuously in State and federal waters regardless of fishery.	**Alternative 5** Observers with 100% coverage; and declaration reports as described under Alternative 2.
	* Limited availability of air and surface craft to monitor conservation areas. * Fish tickets and logbooks used to monitor fishing location	* Same as Alt. 1 plus: * 386 LE , 248 OA exempted trawl & 5 tribal trawl vessels would be required to provide declaration and landing reports * Declaration reports aids in identifying vessels fishing legally in conservation areas from those that are not.		* Same as Alt. 1 & 2 plus: * VMS Unit must be consistent with NMFS standards * Real-time position data would allow enforcement to respond to infractions * Distress signal	* Same as Alt. 1, 2 & 3 plus: * 2-way communications can be used to transmit reports from vessel; to receive operational messages; and to inquire about use of distress signal * Vessel may choose value added services used only by vessel	* Same as Alt. 1 & 2 plus: * Position data can be used as basis for enforcement action * Observer reports could be used to verify vessel activities * Most observer data is beyond the scope of the identified need * Catch composition data would be available to assess the impacts of fishing activities
ISSUE 2: Coverage (Issue 2 applies only when issue 1, alternatives 3, 4 or 5, VMS or observers are selected as the monitoring system)	**Alternative 1** **Status quo**	**Alternative 2A** All vessels registered to a limited entry permit	**Alternative 2B** All limited entry vessels that actually fish in State and federal waters	**Alternative 3** All active limited entry, and open access and recreational charter vessels that fish in conservation areas	**Alternative 4** All active limited entry vessels and all commercial fishing vessels and recreational charter vessels that fish in conservation areas.	**Alternative 5** All active limited entry, open access and recreational charter vessels regardless of where they fish
	* Coverage would be voluntary, except for mandatory observer coverage required under the federal observer program	* In 2001, this was 424 vessels including catcher/ processors (257 trawl, 140 line, 11 pot , and 16 combined gear)	* In 2001, 386 LE vessels landed groundfish (233 trawl, 129 line & 24 pot vessels)	* LE same as Alt. 2B * OA 2,881 vessels * Recreational charter: 659 vessels - If 100% of WA and 90% of CA & OR vessels identified fish in conservation area, 401 if 100% of WA and 50% of CA & OR fish in conservation area	* LE same as Alt. 2B * OA same as Alt. 3 * Recreational charter same as Alt. 3 * Other commercial fisheries: 132 hagfish (7 vessels), spiny lobster (125) rock crab, sheep crab, surfperch, shark,.....	* LE same as Alt. 2B * OA 3,840 vessels * Recreational charter of 724 vessels, with 77 from WA, 232 from OR and 415 from CA
ISSUE 3: VMS Expenditures (Issue 3 applies only when issue 1, alternatives 3 or 4, are selected for the monitoring system)	**Alternative 1** Vessel owner pays for all (NMFS preferred)	**Alternative 2** Vessel owner pays for VMS transceiver		**Alternative 3** NMFS pays for initial VMS transceiver	**Alternative 4** NMFS pays for all (Council preferred)	
	* Vessel pays costs of purchasing, installing and maintaining VMS transceiver unit *Vessel pays all costs associated with the transmission of data * Does not preclude reimbursement for all or a portion of expenditures	* Vessel would be responsible for paying all costs associated with purchasing, installing and maintaining the VMS transceiver. * NMFS pays for transmission of reports and data * Federal funding not available		* NMFS pays vessel for all or a portion of VMS transceiver * Vessel pays for installation, maintenance and replacement. * Transmission costs paid by vessel * Federal funding not available	* NMFS would be responsible for paying all costs associated with purchasing, installing and maintaining the VMS transceiver unit, as well as the costs associated with the transmission of report and data rom the vessel * Federal funding not currently available	

ISSUE 1: THE MONITORING SYSTEM This issue defines the types of systems and reporting requirements that could be used to monitor fishing activities to ensure the integrity of groundfish conservation areas. The alternatives below describe three different approaches to a monitoring system including: a declaration system, a VMS program, and fishery Observers.

Alternative 1: Status quo. Do not define a specific monitoring system for managing the integrity of groundfish conservation areas. Do not define reporting requirements for groundfish vessels that are conducting legal fishing activities in conservation areas.

Discussion: Traditional monitoring techniques, including monitoring from air and surface craft, analysis of fish tickets and vessel logbooks would continue to be used to monitor vessel activity in relationship to geographically-defined management areas where fishing activity is restricted. Enforcement resources would continue to be used to identify questionable behavior and locate vessels over a large geographical area and within fishing fleets targeting multiple species.

Alternative 2: Declaration system only. Require the operator of any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, to send a declaration report before leaving port identifying their intent to fish within a conservation area specific to their gear type.

Discussion: As with Alternative 1, traditional monitoring techniques including monitoring from air and surface craft, analysis of fish tickets, and vessel logbooks would continue to be used to monitor vessel activity in relationship to geographically- defined conservation areas where fishing activity is restricted. To assist enforcement in identifying vessels that are legally fishing in conservation areas, the operator of any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, would be required to identify their intent to fish within a conservation area specific to their gear type. A valid declaration report must be received by NMFS before the vessel leaves port. Declaration reports would be made to sent to NMFS and vessel operators would receive conformation that could be used to verify that the reporting requirement was met. Declaration reports must be submitted through the VMS or another method that is approved by NMFS OLE and announced in the Federal Register. Other methods may include email, facsimile, or telephone. NMFS OLE will provide, through appropriate media, instructions to the public on submitting declaration reports. This reporting requirement would affect approximately 386 limited entry vessels (Tables 3.3.2.1) , 248 open access vessels (Table 3.3.2.3) and 5 tribal vessels. Salmon troll and sport charter vessels are visually unique and would therefore not be required to provide declaration reports.

Alternative 3: Basic VMS system - one way communications (NMFS and Council preferred alternative). Establish standards for VMS transceiver and mobile communication service providers that are consistent with the VMS standards published on March 31, 1994 at 59 FR 15180 and the specifications published by OLE in the Commerce Business Daily on September 8, 1998 (Appendix A). Any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, would be required to send a declaration report to identify their intent to fish within a conservation area specific to their gear type.

Discussion: This alternative provides for a basic VMS system that would transmit vessel positions, via secured satellite communications, to a central data processing center managed by the NMFS OLE. Because GPS positions provide accuracy to within 50 meters, vessel position data could be used by managers to monitor fleet behavior and by enforcement to identify questionable fishing activity and easily locate individual vessels. One-way communications allow a vessel's position to be sent to NMFS through a communication service provider. It also allows for a distress signal to be sent from the vessel. Although the interval between position fixes and receipt by NMFS is not specified in the national standards, the

transceiver units currently available that meet the criteria defined above for this alternative transmit data within approximately 5 minutes of the position fix. This alternative is intended to define minimum requirements and would not preclude a vessel owner from procuring a VMS unit approved by NMFS for the Pacific Coast groundfish fishery that provides additional services and capabilities used exclusively by the vessel owner and operator. It is NMFS intention to approve VMS transceivers and service providers and publish a list of type approved units for the Pacific Coast groundfish fishery. Transceiver manufactures or communication service providers may continue to submit products or services to NMFS for evaluation based on the published specifications (March 31, 1994, at 59 FR 151180 and the specifications published by OLE in the Commerce Business Daily on September 8, 1998). As necessary, NMFS will publish amendments to the list of approved systems in the Federal Register.

Any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, would be required to send a declaration report to identify their intent to fish within a conservation area specific to their gear. A valid declaration report must be received by NMFS before the vessel leaves port. Declaration reports would be made to sent to NMFS and vessel operators would receive conformation that could be used to verify that the reporting requirement was met. Declaration reports must be submitted through the VMS or another method that is approved by NMFS OLE and announced in the Federal Register. Other methods may include email, facsimile, or telephone. This notice requirement would affect approximately 386 limited entry vessels (Tables 3.3.2.1) , 248 open access vessels (Table 3.3.2.3) and 5 tribal vessels.

VMS transceiver units that are expected to be type-approved for the fishery range in price from approximately $800 (this is contingent on the low end units being approved by OLE) to $3,800 per unit, installed. The costs per day for data transmissions is $1.67-$5.00. The annual transmission costs may vary between vessels depending on the number of days fished and the model of transceiver the vessel has purchased (most VMS transceiver units, have a feature that detects the lack of motion when the vessel is in port and will automatically reduce position transmissions). NMFS will pay for all costs associated with polling (when the processing center queries the transceiver, outside of regular transmissions, for a position report). The costs of installation are minimal because the transceivers can be installed by the vessel operator. Vessels that already have VMS transceiver units installed for other fisheries or personal purposes may use their current unit providing it is a model that has been type approved for the Pacific Coast groundfish fishery and the software has been upgraded to meet the defined requirements.

Alternative 4: Upgraded VMS system - two way communications. Establish standards for VMS transceiver and mobile communication service providers that are consistent with the final VMS standards published on March 31, 1994, at 59 FR 151180 and the specifications published by OLE in the Commerce Business Daily on September 8, 1998 (Appendix A). In addition to the basic standards described under Alternative 3, the upgraded system would use two-way communications between the vessel and shore such that full or compressed data messages can be transmitted and received by the vessel. Any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, would be required send a declaration report to identify their intent to fish within a conservation area specific to their gear type.

Discussion: This alternative provides for a more advanced VMS system in that it has a message terminal or is attached to a personal commuter. Like Alternative 3, the upgraded system would transmit vessel positions, via secured satellite communications, to a central data processing center managed by the NMFS OLE. Vessel position data could be used by managers to monitor fleet behavior and by enforcement to identify questionable fishing activity and easily locate individual vessels. In addition, VMS systems with two-way satellite communications capability can be used to report suspicious activities directly to State or Federal enforcement officers and the U. S. Coast Guard. Two-way messaging capability allows the necessary position reports to be sent from the vessel, and also has the capability for the vessel to receive operational messages (changes in regulations, weather reports, safety messages,

etc). These communications can be used to solve problems that might otherwise result in an enforcement action. The addition of a manual input device aboard the vessel (keyboard, hand-held terminal, or PC) adds to the catch reporting capability. Two-way communications allow for a distress signal to be sent from the vessel, and also allows for a response or inquiry to be sent back to the vessel. GPS positions provides accuracy to within 50 meters. Accuracy is particularly important given there are many areas where fishing incursions into the conservation areas could occur over very short distances and result in a heavy impact on the resources being protected by the restricted areas. Having a near real-time interval between the position fix and when NMFS receives the report, would allow enforcement to respond to an apparent infraction in near real-time, if resources were available.
These transceiver units range in price from approximately $2,700 to $5,295 per unit, installed. The costs per day for data transmissions is $1-$3.5. The annual transmission costs vary considerably between vessels depending on the number of days fished and proximity of the activities to the conservation areas. NMFS will pay for all costs associated with polling (when the processing center queries the transceiver, outside of regular transmissions, for a position report). The costs of installation are minimal because the transceivers can be installed by the vessel operator. Like Alternative 3, vessels that already have VMS transceiver units installed for other fisheries or business purposes may use their current unit providing it is a model that has been type approved for the Pacific Coast groundfish fishery and the software has been upgraded to meet the defined requirements.

In addition to the VMS requirements, any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, would be required to send a declaration report to identify their intent to fish within a conservation area specific to their gear type. A Declaration reports would be made to sent to NMFS and vessel operators would receive conformation that could be used to verify that the reporting requirement was met. Declaration reports must be submitted through the VMS or another method that is approved by NMFS OLE and announced in the Federal Register. Other methods may include email, facsimile, or telephone. declaration report must be received by NMFS before the vessel leaves port. This reporting requirement would affect approximately 386 limited entry vessels (Tables 3.3.2.1) , 248 open access vessels (Table 3.3.2.3) and 5 tribal vessels.

Alternative 5: Observers. Require vessels to carry observes to monitor vessel activity in relation to groundfish conservation areas. Require operators of any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, to send a declaration report to identify their intent to fish within a conservation area specific to their gear type.

Discussion: Observers are a uniformly trained group of scientific technicians who are stationed aboard vessels to observe fishing activities. Observers gather independent conservation and management data that is too burdensome for vessel personnel to collect and which would otherwise not be available for managing the fisheries. Although the observers do not have a direct role in fisheries compliance, data on fishing effort, which includes fishing location, could be used to in an enforcement action. In 2001, NMFS implemented a Federal observer program in the Pacific Coast groundfish fishery as a viable means to collect much-needed data on at-sea discards. In 2002, approximately 30 observers were stationed along the coast from Bellingham, WA to Morro Bay, CA. In addition, observers have been placed on a voluntary basis aboard offshore catcher/processors and processing vessels in the Pacific whiting fishery to gather total catch, bycatch, and biological data since 1991. Observers carried by vessels under this alternative would be funded by a pay-as-you-go system similar that used by the processing vessels in the whiting fishery. In a pay-as-you-go system the vessel owner is responsible for making arrangement with an observer employment firm who provides the required observer services and for paying all associated costs.

Under this alternative, observers would be available to collect information that could be used to monitor fishing activity in relationship to conservation areas. Supporting these additional observers, would most likely require a substantial expansion of the current observer program infrastructure. Because observer data is processed after a fishing trip is completed, the data would not be available in realtime. Although

critical for management of the fishery, much of the observer's sampling and data are beyond the scope of the identified need and are not directly applicable to monitoring fishing activities to ensure the integrity of groundfish conservation areas.

In additon to the observer requirements, any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, would be required to send a declaration report to identify their intent to fish within a conservation area specific to their gear type. A valid declaration report must be received by NMFS before the vessel leaves port. Declaration reports would be made to sent to NMFS and vessel operators would receive conformation that could be used to verify that the reporting requirement was met. Declaration reports must be submitted through the VMS or another method that is approved by NMFS OLE and announced in the Federal Register. Other methods may include email, facsimile, or telephone. This reporting requirement would affect approximately 386 limited entry vessels (Tables 3.3.2.1) , 248 open access vessels (Table 3.3.2.3) and 5 tribal vessels.

ISSUE 2: COVERAGE This issue identifies the sectors of the groundfish fleet that would be required to have a VMS or observer monitoring system, as identified under issue 1, Alternatives 3,4, and 5, in place in order to participate in Pacific Coast groundfish fishery.

Alternative 1: Status quo. Do not specify mandatory coverage requirements for a monitoring system.

Discussion: Under the existing regulations vessels could elect to voluntarily carry a VMS transceiver unit and provide position reports when they choose. Vessels would be expected to carry a Federal observer when randomly selected from the overall pool of vessels. In 2002, approximately 30 observers were stationed along the coast from Bellingham, WA to Morro Bay, CA. If coverage in 2003 were allocated in the same proportions as 2002, approximately 75% of observer time would be dedicated to cover the limited entry trawl fishery with the remaining 25% of observer time used to collect data on fixed gear and open access. Observers would continue to be placed on a voluntary basis on board offshore catcher/processors and mothership processing vessels in the Pacific whiting fishery.

Alternative 2A: All vessels registered to a limited entry permit. Beginning in 2003, require all trawl and fixed gear vessels registered to limited entry permits to have VMS or an observer as specified under issue 1, Alternatives 3,4, and 5. Vessels would be required to have VMS transceiver units or observers on board at all times regardless of the fishery.

Discussion: This alternative would affect all vessels registered to limited entry permits beginning in 2003, regardless of where they fish or if they fished in federal or state waters off the coasts of the Washington, Oregon or California. In 2001, there were 424 vessels with Pacific Coast groundfish limited entry permits, of which 257 were trawl vessels, 140 were longline vessels and, 11 were trap vessels, and 16 were combined gear permits (Tables 3.3.2.1). Since 2001, the number of vessels registered for use with limited entry permits has decreased because of implementation of the permit stacking program for sablefish-endorsed limited entry fixed gear permits.

This alternative would allow enforcement to effectively monitor limited entry trawl vessels for unlawful incursions into conservation areas while allowing legal incursions, such as midwater trawling, for Pacific whiting, yellowtail and widow rockfish and non-groundfish target fisheries, to occur. Vessels registered to a limited entry permit would be required to have either an operable VMS unit or an observer on board. A notable number of limited entry vessels also participate in non-groundfish fisheries, such as shrimp and prawn trawl fisheries, troll albacore and troll salmon fisheries, and the pot fisheries for crab. These fisheries would continue to occur in the conservation area. Vessels would be required to have either an operable VMS unit or an observer on board whenever the vessel was used to fish in state or federal waters off the states of Washington, Oregon or California.

Alternative 2B: All vessels registered to a limited entry permit and that fish for groundfish Beginning in 2003, require all trawl and fixed gear vessels registered to limited entry permits to have either

VMS or an observer, as specified under issue 1, Alternatives 3,4,and 5 before the vessel can be used to fish in the Pacific Coast groundfish fishery. Vessels would be required to have a VMS transceiver or an observer on board whenever the vessel was operating in waters of the states of Washington, Oregon or California.

Discussion: This alternative is the same as alternative 2A except that it would not require VMS or observers on vessels registered to limited entry permits unless they are used to harvest groundfish during the fishing year. This alternative is different from 2A in that it recognizes that not all vessels registered to a limited entry permit are used to harvest groundfish and therefore only requires vessels that fish to incur the cost of purchasing and installing a VMS unit. In 2001, there were 386 of the 424 vessels registered to limited entry permits actually fished in the Pacific Coast groundfish fishery. Of these 386 vessels, 233 were trawl vessels, 129 were longline vessels, and 24 were trap vessels (Tables 3.3.2.1). Vessels would be required to have a VMS transceiver or an observer on board whenever the vessel was operating in state or federal waters off the states of Washington, Oregon or California.

NOTE TO THE READER: The Council and NMFS preferred alternative of all vessels registered to a limited entry permit and that fish in waters off Washington, Oregon, and California falls between alternatives 2A and 2B. Under the preferred alternative all trawl and fixed gear vessels registered to limited entry permits would be required to have either VMS, as specified under issue 1 Alternative 3, before they can fish in any fishery in the waters off Washington, Oregon, and California. Vessels would be required to have VMS transceiver unit on board at all times regardless of the fishery and regardless if they target or landed groundfish. The number of limited entry vessels affected by the alternative falls between 386 (Alternative 2B) and 424 (Alternative 2A) and is not specifically analyzed in this analysis because the exact number is unknown. For the purposes of this analysis , 424 vessels, as would be affected under Alternative 2A will be used to evaluate the impacts.

Alternative 3: All vessels registered to limited entry permits regardless of where in the in federal or state waters off the coasts of the washington, Oregon or California fishing occurs; and all open access and recreational charter vessels that fish in the conservation areas. Beginning in 2003, require all trawl and fixed gear vessels registered to a limited entry permit to have either VMS or an observer as specified under issue 1, Alternatives 3,4,and 5 before they can fish in the Pacific Coast groundfish fishery. By 2004, begin phasing in VMS or an observer requirement for open access vessels (including exempted gears) that fish within a conservation area. Open access fisheries would be prioritized by the estimated impacts on overfished species. By 2004, begin phasing in VMS or an observer requirement for recreational charter vessels that fish within a conservation area. Vessels would be required to have VMS transceiver unit or an observer on board at all times regardless of the fishery.

Discussion: Requirements for the limited entry fleet under this alternative are the same as alternative 2B. In addition to the requirements under 2B, this alternative would require open access gears that fished in the conservation area to have an operable VMS unit or an observer on board at all times. This is estimated to affect 386 limited entry vessels (Tables 3.3.2.1), 2,881 open access vessels (Table 3.3.2.3) and less than 659 recreational charter vessels (Tables 3.3.4.1).

Alternative 4: All vessels registered to limited entry permits fishing in the in federal or state waters off the coasts of the Washington, Oregon or California; all fishing vessels operating in conservation area. Beginning in 2003, require all trawl and fixed gear vessels registered to a limited entry permit to have either VMS or an observer as specified under Issue 1, Alternatives 3, 4. and 5, before they can fish in the Pacific Coast groundfish fishery. By 2004, begin phasing in VMS or observer requirements for all other fishing vessels that operate in the conservation areas. Fisheries would be prioritized by the estimated impacts on overfished species. Vessels would be required to have VMS transceiver unit or an observer on board at all times regardless of the fishery.

Discussion: Requirements for the limited entry fleet under this alternative are the same as Alternative 2B. Requirements for the open access gears and recreational charter vessels would be the same as Alternative 3. In addition, this alternative would require all other commercial fishing vessels operating in

the conservation area to have an operable VMS unit or an observer on board at all times. This is estimated to affect 386 limited entry vessels (Tables 3.3.2.1), 2,881 open access vessels (Table 3.3.2.3), less than 659 recreational charter vessels (Tables 3.3.4.1), and 132 vessels from other commercial fisheries (Table 3.3.2.3).

Alternative 5: All limited entry, open access, and recreational charter vessels regardless of where in the in federal or state waters off the coasts of the washington, Oregon or California fishing occurs. Beginning in 2003, require all trawl and fixed gear vessels registered to a limited entry permit to have either VMS or an observer as specified under issue 1, before they can fish in the Pacific Coast groundfish fishery. By 2004, begin phasing in VMS or observer requirements for all open access and recreational charter vessels regardless of where the vessel is fishing. Fisheries would be prioritized by the estimated impacts on overfished species. Vessels would be required to have VMS unit or an observer on board at all times regardless of the fishery.

Discussion: Requirements for the limited entry fleet under this alternative are the same as Alternative 2B. Requirements for the open access gears and recreational charter vessels would include all vessels that can legally take groundfish, regardless of where they are fishing in relation to the conservation areas. This alternative would allow enforcement to monitor all groundfish vessels throughout the year, regardless of the fisheries in which they participate. This is estimated to affect 386 limited entry vessels (Tables 3.3.2.1), 3,840 open access vessels (Table 3.3.2.3) and 724 recreational charter vessels (Tables 3.3.4.1).

ISSUE 3: VMS RELATED EXPENDITURES -- This issue defines the responsibilities for purchasing, installation, and maintenance of VMS transceiver units, as well as the responsibilities for transmission of reports and data.

Alternative 1: Vessel pays all. Under this alternative the vessel would be responsible for paying all costs associated with purchasing, installing and maintaining the VMS transceiver unit, as well as the costs associated with the transmission of reports and data from the vessel. This alternative would not preclude reimbursement for all or a portion of expenditures at a later point in time if money were available.

Alternative 2: Vessel pays for transceiver. Under this alternative the vessel would be responsible for paying for all costs associated with purchasing, installing and maintaining the VMS transceiver unit. NMFS would pay for transmission of reports and data only.

Alternative 3: NMFS pays for initial transceiver. Under this alternative, NMFS pays or reimburses the vessel owner for all or a portion of the initial VMS transceiver unit. Associated expenses including installation, maintenance and replacement would be paid for by the vessel. Transmission costs would also be paid for by the vessel.

Alternative 4: NMFS pays all. Under this alternative NMFS would be responsible for paying all costs associated with purchasing, installing and maintaining the VMS transceiver unit, as well as the costs associated with the transmission of reports and data from the vessel.

Alternatives that were rejected

Electronic chart plotters have become an increasingly important part of the navigational equipment on many recreational and commercial vessels. Plotters vary widely, ranging from hand-held units with small screens to full color, large screen computer monitor displays and the International Maritime Organization approved Electronic Chart and Information Display Systems. The electronic charts displayed by plotters contain useful information from official charts, issued by the National Oceanographic and Atmospheric Administration (NOAA), and non-official charts such as marina data. Official marine charts issued by NOAA show boundaries of land and water, water depths and contour lines, type, identification and location of aids to navigation, position of channels, danger and prohibited areas and locations of shore-side facilities. Various information from NOAA charts may be absent on some electronic charts. In general, electronic charts are not legal replacements for paper charts.

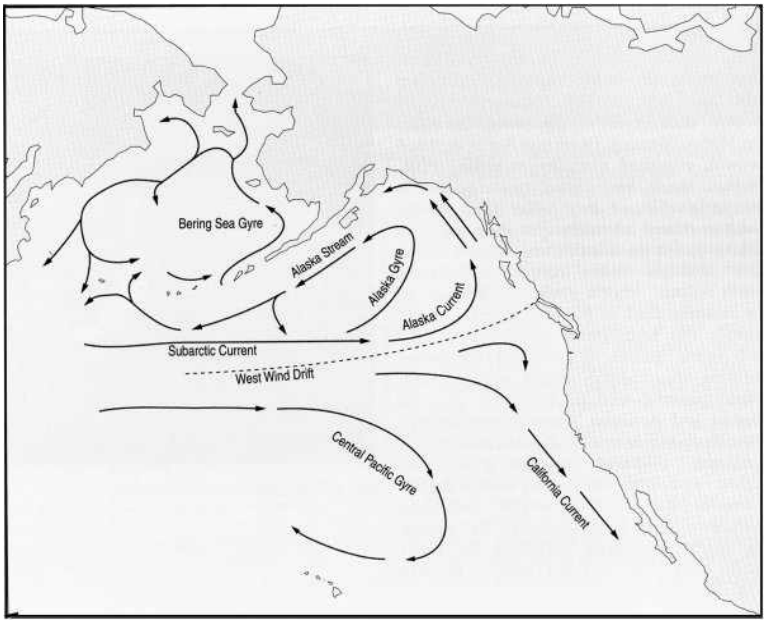
A chart plotter's greatest value is in its ability to convert the precise but abstract position information supplied by the GPS or Loran into an easily understood picture of the vessel's position in relation to its surroundings. This improves the navigator's situational awareness, his ability to correlate his vessel's position in relation to surrounding land, channel boundaries and various navigation aids and other vessels. Even low cost chart plotters that depict vessel position on a minimal content chart can greatly aid the user in "finding" his vessel's position on the chart being used for navigation. More complex plotters, full detail charts can do much more, including voyage planning, rapid input of waypoints, calculation of distances, courses and preparation of voyage time estimates.

Although plotters are a suitable tool for vessel operators to use to monitor their vessel activity in relation to depth-based management areas, it is not a suitable tool for monitoring fleetwide compliance with closed or restricted areas. The use of plotters as an viable alternative under Issue 1, monitoring systems, was rejected for several reasons including: 1) plotters are not tamper proof -- data could be deleted or false data could be loaded in the memory; 2) not all plotters are capable of storing the information necessary for the enforcement of depth-based management areas; 3) data stored on plotters would not be available until after the vessel returned to port or upon boarding; 4) the accuracy of charts and position information may vary between the different types and brands with some plotters collecting data that is not accurate enough for enforcement purposes; 5) plotters can easily be turned on and off by the vessel operator.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Environment

California Current System. In the North Pacific Ocean, the large, clockwise-moving North Pacific Gyre circulates cold, sub-arctic surface water eastward splitting at the North American continent into the northward-moving Alaska Current and the southward-moving California Current (Figure 3.1.1). The California Current, a surface current, flows southward along the U.S. west coast and through the U.S. EEZ, the management area for the groundfish FMP. The California Current is known as an eastern boundary current, meaning that it draws ocean water along the eastern edge of an oceanic current gyre. Along the continental margin and beneath the California Current, waters off the U.S. West Coast are subject to major nutrient upwelling, particularly off Cape Mendocino (Bakun, 1996). Shoreline topographic features such as Cape Blanco, Point Conception and bathymetric features such as banks, canyons, and other submerged features, often create large-scale current patterns like eddies, jets, and squirts. Currents off Cape Blanco, for example, are known for a current "jet" that drives surface water offshore to be replaced by upwelling sub-surface water (Barth, et al, 2000). One of the better-known current eddies off the West Coast occurs in the Southern California Bight, between Point Conception and Baja California (Longhurst, 1998), wherein the current circles back on itself by moving in a northward and counterclockwise direction just within the Bight. The influence of these lesser current patterns and of the California Current on the physical and biological environment varies seasonally (Lynn, 1987) and through larger-scale climate variation, such as El Niño-La Niña or Pacific Decadal Oscillation (Longhurst, 1998).



Topography. Physical topography off the U.S. West Coast is characterized by a relatively narrow continental shelf. The 200 m depth contour shows a shelf break closest to the shoreline off Cape Mendocino, Point Sur, and in the Southern California Bight and widest from central Oregon north to the Canadian border as well as off Monterey Bay. Deep submarine canyons pocket the EEZ, with depths greater than 4,000 m common south of Cape Mendocino..

Essential Fish Habitat (EFH). EFH for Pacific Coast groundfish is defined as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. The groundfish species managed by the FMP occur throughout the EEZ and occupy diverse habitats at all stages in their life histories. Some species are widely dispersed during certain life stages, particularly those with pelagic eggs and larvae; the essential fish habitat (EFH) for these species/stages is correspondingly large. On the other hand, the EFH of some species/stages may be comparatively small, such as that of adults of many nearshore rockfishes which show strong affinities to a particular location or type of substrate. When these EFHs for all groundfish species are taken together, the groundfish fishery EFH includes all waters from the mean higher high water line, and the upriver extent of saltwater intrusion in river mouths seaward to the boundary of the U.S. EEZ.

The Pacific Coast groundfish FMP groups the various EFH descriptions into seven major habitat types called "composite" EFHs. This approach focuses on ecological relationships among species and between

the species and their habitat, reflecting an ecosystem approach in defining EFH. The seven "composite" EFH identifications are as follows.

1. Estuarine - Those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW, which is the high tide line) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation).

2. Rocky Shelf - Those waters, substrates, and associated biological communities living on or within 10 meters (5.5 fathoms) overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

3. Nonrocky Shelf - Those waters, substrates, and associated biological communities living on or within 10 meters (5.5 fathoms) overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

4. Canyon - Those waters, substrates, and associated biological communities living within submarine canyons, including the walls, beds, seafloor, and any outcrops or landslide morphology, such as slump scarps and debris fields.

5. Continental Slope/Basin - Those waters, substrates, and biological communities living on or within 20 meters (11 fathoms) overlying the substrates of the continental slope and basin below the shelf break (~200 meters or 109 fathoms) and extending to the westward boundary of the EEZ.

6. Neritic Zone - Those waters and biological communities living in the water column more than 10 meters (5.5 fathoms) above the continental shelf.

7. Oceanic Zone - Those waters and biological communities living in the water column more than 20 meters (11 fathoms) above the continental slope and abyssal plain, extending to the westward boundary of the EEZ.

Life history and habitat needs for the species managed under the FMP are described in the EFH appendix to Amendment 11, which is available online at http://www.nwr.noaa.gov/1sustfsh/efhappendix/page1.html.

3.2 Biological Environment

3.2.1 Groundfish Resources

Each fishing year, the Council uses the best available stock assessment data to evaluate the biological condition of the Pacific Coast groundfish fishery and to develop estimates of ABCs for major groundfish stocks. The ABCs are biologically based estimates of the amount of fish that may be harvested from the fishery each year without jeopardizing the resource. The ABC may be modified to incorporate biological safety factors and risk assessment due to uncertainty.

The ABC for a species or species group is generally derived by multiplying the harvest rate proxy (F_{MSY} proxy) by the exploitable biomass. When setting the ABCs, the Council maintained a policy of using a default harvest rate as a proxy for the fishing mortality rate (F_{MSY} proxy) that is expected to achieve the maximum sustainable yield. Harvest rate policies must account for several complicating factors, including the age and size at which individuals in a stock reach maturity, the relative fecundity of mature individuals over time, and the optimal stock size for the highest level of productivity within that stock. Default harvest rate proxies were recommended by the Council's Scientific and Statistical Committee (SSC) in 2001 (66 FR 2338, January 11, 2001) and continue to be used. These recommended harvest rate proxies are: $F_{40\%}$ for flatfish and whiting, $F_{50\%}$ for rockfish (including thornyheads,) and $F_{45\%}$ for other groundfish such as sablefish and lingcod.

Harvest levels or OYs are established each year for the species or species groups that the Council proposes to manage. Groundfish species and species groups with OYs include bocaccio, canary rockfish, chilipepper rockfish, cowcod, darkblotched rockfish, Dover sole, lingcod, longspine thornyhead, the minor rockfish complexes (northern and southern for nearshore, continental shelf, and continental slope species,) Pacific cod, Pacific ocean perch, Pacific whiting, sablefish, shortbelly rockfish, shortspine thornyhead, splitnose rockfish, widow rockfish, yelloweye rockfish, and yellowtail rockfish. Numerical OYs are not set for every stock, especially where harvest has been less than ABC.

The Magnuson-Stevens Act requires an FMP to prevent overfishing. Overfishing is defined in the National Standards Guidelines (63 FR 24212, May 1, 1998) as exceeding the fishing mortality rate needed to produce maximum sustainable yield. The OY harvest levels are set at levels that are expected to prevent overfishing, equal to or less than the ABCs. The term "overfished" describes a stock whose abundance is below its overfished/rebuilding threshold. Overfished/rebuilding thresholds are generally linked to the same productivity assumptions that determine the ABC levels. The default value of this threshold is 25% of the estimated unfished biomass level or 50% of B_{MSY}, if known. Nine groundfish species are below the overfished threshold: bocaccio, canary rockfish, cowcod (south of Point Conception,) darkblotched rockfish, lingcod, Pacific whiting, Pacific ocean perch, widow rockfish, and yelloweye rockfish.

Table 3.2.1.1 , Summary of Stock Status for Pacific Coast Groundfish Species, summarizes the biological condition of the Pacific Coast groundfish stocks. More detailed information on the status of each of these species or species groups is available in the stock assessments associated with the annual SAFE report, as well as in the Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Proposed Groundfish ABC and OY specifications and management measures for the 2003 Pacific Coast Groundfish Fishery. These documents are available from the Council office.

Table 3.2.1.1. Summary of Stock Status for Pacific Coast Groundfish Species				
Species	**Year of Most Recent Stock Assessment**	**Biomass Estimate (% Unfished)**	**Did overfishing Occur in 2001? Was the fishing mortality above the MSST[1]?**	**Is the stock overfished in 2001? Was the Biomass below the MSST threshold?**
Roundfish				
Lingcod	2001 revision	15%	No	Yes
Pacific Cod			Unknown	Unknown
Pacific whiting	2002	24%	No	Yes
Sablefish	2002	31%-38%	No	No
Flatfish				
Dover sole	2001	29%	No	No
English sole	1993		Unknown	Unknown
Petrale sole	1999	42%	Unknown	Unknown
Arrowtooth	1993		No	No
Other flatfish			Unknown	Unknown
Rockfish				
POP	2000		No	Yes
Shortbelly	1989	>43%	No	No
Widow	2000	24%	No	Yes
Canary	2002	8%	No	Yes
Chilipepper	1998	46%-61%	No	No
Bocaccio	2002	3.6% Southern stock	No	Yes
Splitnose	1994		Unknown	Unknown
Yellowtail	2000	63%	No	No
Shortspine	2001	25%-50%	No	No
Longspine	1998	>40%	No	No
Darkblotched	2000	22%	No	Yes
Yelloweye	2002	24%	No	Yes
Cowcod	1999	4%-11%	No	Yes
Bank	2000	25%-31%	No	No
Black	1999 & 2001[2]	35% 2/	No	**No**
Blackgill	1998	51%	Unknown	Unknown
Redstripe			Unknown	Unknown
Sharpchin			Unknown	Unknown
Silvergrey			No	Unknown
Yellowmouth			Unknown	Unknown
Other rockfish			Unknown	**Unknown**
Other fish			Unknown	**Unknown**

1/ MSST – The minimum stock size threshold (overfished/rebuilding threshold) is the default value of 25% of the estimated unfished biomass level or 50% of B_{MSY}, if known.
2/ 2001 update completed for Oregon only.

The Pacific Coast groundfish FMP manages over 80 species which are divided by type as follows: roundfish, flatfish, rockfish, sharks, skates, ratfish, morids, and grenadiers. These species, occur throughout the EEZ and occupy diverse habitats at all stages in their life history. Information on the interactions between the various groundfish species and between groundfish and non-groundfish species varies in completeness. While a few species have been intensely studied, there is relatively little information on most groundfish species

Roundfish

Lingcod (*Ophiodon elongatus*), a top order predator of the family Hexagrammidae, ranges from Baja California to Kodiak Island in the Gulf of Alaska. Lingcod is demersal at all life stages (Allen and Smith 1988, NOAA 1990, Shaw and Hassler 1989). Adult lingcod prefer two main habitat types: slopes of submerged banks 10-70 m below the surface with seaweed, kelp and eelgrass beds and channels with swift currents that flow around rocky reefs (Emmett et al. 1991, Giorgi and Congleton 1984, NOAA 1990, Shaw and Hassler 1989). Juveniles prefer sandy substrates in estuaries and shallow subtidal zones (Emmett et al. 1991, Forrester 1969, Hart 1973, NOAA 1990, Shaw and Hassler 1989). As the juveniles grow they move to deeper waters. Adult lingcod are considered a relatively sedentary species, but there are reports of migrations of greater than 100 km by sexually immature fish (Jagielo 1990, Mathews and LaRiviere 1987, Mathews 1992, Smith et al. 1990).

Mature females live in deeper water than males and move from deep water to shallow water in the winter to spawn (Forrester 1969, Hart 1973, Jagielo 1990, LaRiviere et al. 1980, Mathews and LaRiviere 1987, Mathews 1992, Smith et al. 1990). Mature males may live their whole lives associated with a single rock reef, possibly out of fidelity to a prime spawning or feeding area (Allen and Smith 1988, 298, Shaw and Hassler 1989). Spawning generally occurs over rocky reefs in areas of swift current (Adams 1986, Adams and Hardwick 1992, Giorgi 1981, Giorgi and Congleton 1984, LaRiviere et al. 1980). After the females leave the spawning grounds, the males remain in nearshore areas to guard the nests until the eggs hatch. Hatching occurs in April off Washington but as early as January and as late as June at the geographic extremes of the lingcod range. Males begin maturing at about 2 years (50 cm), whereas females mature at 3+ years (76 cm). In the northern extent of their range, fish mature at an older age and larger size (Emmett et al. 1991, Hart 1973, Mathews and LaRiviere 1987, Miller and Geibel 1973, Shaw and Hassler 1989). The maximum age for lingcod is about 20 years (Adams and Hardwick 1992).

Lingcod are a visual predator, feeding primarily by day. Larvae are zooplanktivores (NOAA 1990). Small demersal juveniles prey upon copepods, shrimps and other small crustaceans. Larger juveniles shift to clupeids and other small fishes (Emmett et al. 1991, NOAA 1990). Adults feed primarily on demersal fishes (including smaller lingcod), squids, octopi and crabs (Hart 1973, Miller and Geibel 1973, Shaw and Hassler 1989). Lingcod eggs are eaten by gastropods, crabs, echinoderms, spiny dogfish, and cabezon. Juveniles and adults are eaten by marine mammals, sharks, and larger lingcod (Miller and Geibel 1973, NOAA 1990)

Pacific Cod (*Gadus macrocephalus*) are widely distributed in the coastal north Pacific, from the Bering Sea to southern California in the east, and to the Sea of Japan in the west. Adult Pacific cod occur as deep as 875 m (Allen and Smith 1988), but the vast majority occurs between 50 and 300 m (Allen and Smith 1988, Hart 1973, Love 1991, NOAA 1990). Along the West Coast, Pacific cod prefer shallow, soft-bottom habitats in marine and estuarine environments (Garrison and Miller 1982), although adults have been found associated with coarse sand and gravel substrates (Palsson 1990, Garrison and Miller 1982). Larvae and small juveniles are pelagic; large juveniles and adults are parademersal (Dunn and Matarese 1987, NOAA 1990). Adult Pacific cod are not considered to be a migratory species. There is however a seasonal bathymetric movement from deep spawning areas of the outer shelf and upper slope in fall and winter to shallow middle-upper shelf feeding grounds in the spring (Dunn and Matarese 1987, Hart 1973, NOAA 1990, Shimada and Kimura 1994).

Pacific cod have external fertilization (Hart 1973, NOAA 1990) and spawning from late fall to early spring. Their eggs are demersal. Larvae may be transported to nursery areas by tidal currents (Garrison and

Miller 1982). Half of females are mature by 3 years (55 cm), and half of males are mature by 2 years (45 cm) (Dunn and Matarese 1987, Hart 1973). Juveniles and adults are carnivorous, and feed at night (Allen and Smith 1988, Palsson 1990) with the main part of the adult Pacific cod diet being whatever prey species is most abundant (Kihara and Shimada 1988,Klovach et al. 1995). Larval feeding is poorly understood. Pelagic fish and sea birds eat Pacific cod larvae, while juveniles are eaten by larger demersal fishes, including Pacific cod. Adults are preyed upon by toothed whales, Pacific halibut, salmon shark, and larger Pacific cod (Hart 1973, Love 1991, NOAA 1990, Palsson 1990). The closest competitor of the Pacific cod for resources is the sablefish (Allen 1982).

Pacific Whiting (*Merluccius productus*), also known as Pacific hake, is a semi-pelagic merlucciid (a cod-like fish species) that range from Sanak Island in the western Gulf of Alaska to Magdalena Bay, Baja California Sur. They are most abundant in the California Current System (Bailey 1982, Hart 1973, Love 1991, NOAA 1990). Smaller populations of Pacific whiting occur in several of the larger semi-enclosed inlets of the northeast Pacific Ocean, including the Strait of Georgia, Puget Sound, and the Gulf of California (Bailey et al. 1982, Stauffer 1985). The highest densities of Pacific hake are usually between 50 and 500 m, but adults occur as deep as 920 m and as far offshore as 400 km (Bailey 1982, Bailey et al. 1982, Dark and Wilkins 1994, Dorn 1995, Hart 1973, NOAA 1990, Stauffer 1985). Hake school at depth during the day, then move to the surface and disband at night for feeding (McFarlane and Beamish 1986, Sumida and Moser 1984, Tanasich et al. 1991). Coastal stocks spawn off Baja California in the winter, then the mature adults begin moving northward and inshore, following food supply and Davidson currents (NOAA 1990). Hake reach as far north as southern British Columbia by fall. They then begin the southern migration to spawning grounds and further offshore (Bailey et al. 1982, Dorn 1995, Smith 1995, Stauffer 1985).

Spawning occurs from December through March, peaking in late January (Smith 1995). Pacific hake are oviparous with external fertilization. Eggs of the Pacific hake are neritic and float to neutral buoyancy (Baily 1981, Bailey et al. 1982, NOAA 1990). Hatching occurs in 5-6 days and within 3-4 months juveniles are typically 35 mm (Hollowed 1992). Juveniles move to deeper water as they get older (NOAA 1990). Females off mature at 3-4 years (34-40 cm,) and nearly all males are mature by 3 years (28 cm). Females grow more rapidly than males after four years; growth ceases for both sexes at 10-13 years (Bailey et al. 1982).

All life stages feed near the surface late at night and early in the morning (Sumida and Moser 1984). Larvae eat calanoid copepods, as well as their eggs and nauplii (McFarlane and Beamish 1986, Sumida and Moser 1984). Juveniles and small adults feed chiefly on euphausiids (NOAA 1990). Large adults also eat amphipods, squid, herring, smelt, crabs, and sometimes juvenile hake (Bailey 1982, Dark and Wilkins 1994, McFarlane and Beamish 1986, NOAA 1990). Eggs and larvae of Pacific hake are eaten by pollock, herring, invertebrates, and sometimes hake. Juveniles are eaten by lingcod, Pacific cod and rockfish species. Adults are preyed on by sablefish, albacore, pollock, Pacific cod, marine mammals, soupfin sharks and spiny dogfish (Fiscus 1979, McFarlane and Beamish 1986, NOAA 1990).

Sablefish (*Anoplopoma fimbria*) are abundant in the north Pacific, from Honshu Island, Japan, north to the Bering Sea, and southeast to Cedros Island, Baja California. There are at least three genetically distinct populations off the West Coast of North America: one south of Monterey characterized by slower growth rates and smaller average size, one that ranges from Monterey to the U.S./Canada border that is characterized by moderate growth rates and size, and one ranging off British Columbia and Alaska characterized by fast growth rates and large size. Large adults are uncommon south of Point Conception (Hart 1973, Love 1991, McFarlane and Beamish 1983a, McFarlane and Beamish 1983b, NOAA 1990). Adults are found as deep as 1,900 m, but are most abundant between 200 and 1,000 m (Beamish and McFarlane 1988, Kendall and Matarese 1987, Mason et al. 1983). Off southern California, sablefish were abundant to depths of 1500 m (MBC 1987). Adults and large juveniles commonly occur over sand and mud (McFarlane and Beamish 1983a, NOAA 1990) in deep marine waters. They were also reported on hard-packed mud and clay bottoms in the vicinity of submarine canyons (MBC 1987).

Spawning occurs annually in the late fall through winter in waters greater than 300 m (Hart 1973, NOAA 1990). Sablefish are oviparous with external fertilization (NOAA 1990). Eggs hatch in about 15 days (Mason et al. 1983, NOAA 1990) and are demersal until the yolk sac is absorbed (Mason et al. 1983). After yolk sac is absorbed, the age-0 juveniles become pelagic. Older juveniles and adults are benthopelagic. Larvae and small juveniles move inshore after spawning and may rear for up to four years (Boehlert and Yoklavich 1985, Mason et al. 1983). Older juveniles and adults inhabit progressively deeper waters. The best estimates indicate that 50% of females are mature at 5-6 years (24 inches), and 50% of males are mature at 5 years (20 inches).

Sablefish larvae prey on copepods and copepod nauplii. Pelagic juveniles feed on small fishes and cephalopods, mainly squids (Hart 1973, Mason et al. 1983). Demersal juveniles eat small demersal fishes, amphipods and krill (NOAA 1990). Adult sablefish feed on fishes like rockfishes and octopus (Hart 1973, McFarlane and Beamish 1983a). Larvae and pelagic juvenile sablefish are heavily preyed upon by sea birds and pelagic fishes. Juveniles are eaten by Pacific cod, Pacific halibut, lingcod, spiny dogfish, and marine mammals, such as Orca whales (Cailliet et al. 1988, Hart 1973, Love 1991, Mason et al. 1983, NOAA 1990). Sablefish compete with many other co-occurring species for food, mainly Pacific cod and spiny dogfish (Allen 1982).

Flatfish

Dover Sole (*Microstomus pacificus*) are distributed from the Navarin Canyon in the northwest Bering Sea and westernmost Aleutian Islands to San Cristobal Bay, Baja California (Hagerman 1952, Hart 1973, NOAA 1990). Dover sole are a dominant flatfish on the continental shelf and slope from Washington to southern California. Adults are demersal and are found from 9-1,450 m, with highest abundance below 200-300 m (Allen and Smith 1988). Adults and juveniles, show a high affinity toward soft bottoms of fine sand and mud. Juveniles are often found in deep nearshore waters. Dover sole are considered to be a migratory species. In the summer and fall, mature adults and juveniles can be found in shallow feeding grounds, as shallow as 55 m off British Columbia (Westrheim and Morgan 1963). By late fall, the Dover sole begin moving offshore into deep waters (400 m or more) to spawn. Although there is an inshore-offshore seasonal migration, little north-south coastal migration occurs (Westrheim and Morgan 1963)

Spawning occurs from November-April off Oregon and California (Hart 1973, NOAA 1990, Pearcy et al. 1977) in waters 80-550 m depth at or near the bottom (Hagerman 1952, Hart 1973, Pearcy et al. 1977). Dover sole are oviparous; fertilization is external. Larvae are planktonic, being transported offshore and to nursery areas by ocean currents and winds for up to two years. Settlement to benthic living occurs mid-autumn to early spring off Oregon, and February-July off California (Markle et al 1992). Juvenile fish move into deeper water with age, and begin seasonal spawning-feeding migrations upon reaching maturity.

Dover sole larvae eat copepods, eggs and nauplii, as well as other plankton. Juveniles and adults eat polychaetes, bivalves, brittlestars and small benthic crustaceans. Dover sole feed diurnally by sight and smell (Dark and Wilkins 1994, Gabriel and Pearcy 1981, Hart 1973, NOAA 1990). Dover sole larvae are eaten by pelagic fishes like albacore, jack mackerel and tuna, as well as sea birds. Juveniles and adults are preyed upon by sharks, demersally feeding marine mammals, and to some extent by sablefish (NOAA 1990). Dover sole compete with various eelpout species, rex sole, English sole, and other fishes of the mixed species flatfish assemblage (NOAA 1990).

English Sole (*Parophrys vetulus*) are found from Nunivak Island in the southeast Bering Sea and Agattu Island in the Aleutian Islands, to San Cristobal Bay, Baja California Sur (Allen and Smith 1988). In research survey data, nearly all occurred at depths <250 m (Allen and Smith 1988). Adults and juveniles prefer soft bottoms composed of fine sands and mud (Ketchen 1956), but also occur in eelgrass habitats (Pearson and Owen 1992). English sole uses nearshore coastal and estuarine waters as nursery areas (Krygier and Pearcy 1986, Rogers et al. 1988). Adults make limited migrations. Those off Washington show a northward post-spawning migration in the spring on their way to summer feeding grounds, and a

southerly movement in the fall (Garrison and Miller 1982). Tagging studies have identified separate stocks based on this species' limited movements and meristic characteristics (Jow 1969).

Spawning occurs over soft-bottom mud substrates (Ketchen 1956) from winter to early spring depending on the stock. Eggs are neritic and buoyant, but sink just before hatching (Hart 1973), juveniles and adults are demersal (Garrison and Miller 1982). Small juveniles settle in the estuarine and shallow nearshore areas all along the coast, but are less common in southerly areas, particularly south of Point Conception. Large juveniles commonly occur up to depths of 150 m. Although many postlarvae may settle outside of estuaries, most will enter estuaries during some part of their first year of life (Gunderson et al. 1990). Some females mature as 3-year-olds (26 cm), but all females over 35 cm long are mature. Males mature at 2 years (21 cm).

Larvae are planktivorous. Juveniles and adults are carnivorous, eating copepods, amphipods, cumaceans, mysids, polychaetes, small bivalves, clam siphons, and other benthic invertebrates (Allen 1982, Becker 1984, Hogue and Carey 1982, Simenstad et al. 1079) . English sole feed primarily by day, using sight and smell, and sometimes dig for prey (Allen 1982, Hulberg and Oliver 1979). A juvenile English sole's main predators are probably piscivorous birds such as great blue heron (Ardia herodias), larger fishes and marine mammals. Adults may be eaten by marine mammals, sharks, and other large fishes.

<u>Petrale Sole</u> (*Eopsetta jordani*) are found form Cape St. Elias, Alaska to Coronado Island, Baja California. The range may possibly extend into the Bering Sea, but the species is rare north and west of southeast Alaska and in the inside waters of British Columbia (Garrison and Miller 1982, Hart 1973). Nine separate breeding stocks have been identified, although stocks intermingle on summer feeding grounds (Hart 1973, NOAA 1990). Of these nine, one occurs off British Columbia, two off Washington, two off Oregon and four off California (NOAA 1990). Adults are found from the surf line to 550 m, but their highest abundance is <300 m (NOAA 1990). Adults migrate seasonally between deepwater, winter spawning areas to shallower, spring feeding grounds (NOAA 1990). They show an affinity to sand, sandy mud and occasionally muddy substrates (NOAA 1990).

Spawning occurs over the continental shelf and continental slope to as deep as 550 m. Eggs are pelagic and juveniles and adults are demersal (Garrison and Miller 1982). Eggs and larvae are transported from offshore spawning areas to nearshore nursery areas by oceanic currents and wind. Larvae metamorphose into juveniles at six months (22 cm) and settle to the bottom of the inner continental shelf (Pearcy et al. 1977). Petrale sole tend to move into deeper water with increased age and size. Petrale sole begin maturing at three years. Half of males mature by seven years (29-43 cm) and half of the females are mature by eight years (>44 cm) (Pedersen 1975a, Pedersen 1975b). Near the Columbia River, petrale sole mature one to two years earlier (Pedersen 1975a, Pedersen 1975b).

Larvae are planktivorous. Small juveniles eat mysids, sculpins and other juvenile flatfishes. Large juveniles and adults eat shrimps and other decapod crustaceans, as well as euphausiids, pelagic fishes, ophiuroids and juvenile petrale sole (Garrison and Miller 1982, Hart 1973, 162, NOAA 1990, Pearcy et al. 1977, Pedersen 1975a, Pedersen 1975b). Petrale sole eggs and larvae are eaten by planktivorous invertebrates and pelagic fishes. Juveniles are preyed upon (sometimes heavily) by adult petrale sole, as well as other large flatfishes. Adults are preyed upon by sharks, demersally feeding marine mammals, and larger flatfishes and pelagic fishes (NOAA 1990). Petrale sole competes with other large flatfishes. It has the same summer feeding grounds as lingcod, English sole, rex sole and Dover sole (NOAA 1990).

<u>*Arrowtooth Flounder*</u> (*Atheresthes stomias*) range from the southern coast of Kamchatka to the northwest Bering Sea and Aleutian Islands to San Simeon, California. Arrowtooth flounder is the dominant flounder species on the outer continental shelf from the western Gulf of Alaska to Oregon. Eggs and larvae are pelagic; juveniles and adults are demersal (Garrison and Miller 1982, NOAA 1990). Juveniles and adults are most commonly found on sand or sandy gravel substrates, but occasionally occur over low-relief rock-sponge bottoms Arrowtooth flounder exhibit a strong migration from shallow water summer feeding grounds on the continental shelf to deep water spawning grounds over the continental slope (NOAA

1990). Depth distribution may vary from as little as 50 m in summer to more than 500 m in the winter (NOAA 1990, Rickey 1995).

Arrowtooth flounder are oviparous with external fertilization (Barry 1996). Spawning may occur deeper than 500 m off Washington (Rickey 1995). Larvae eat copepods, their eggs and copepod nauplii (Yang 1995, Yang and Livingston 1985). Juveniles and adults feed on crustaceans (mainly ocean pink shrimp and krill) and fish (mainly gadids, herring and pollock) (Hart 1973, NOAA 1990). Arrowtooth flounder exhibit two feeding peaks, at noon and midnight

"Other Flatfish" are those species that do not have individual ABC/OYs and include butter sole, curlfin sole, flathead sole, Pacific sand dab, rex sole, rock sole, sand sole, and starry flounder. Life history descriptions of these species may be found in the Essential Fish Habitat West Coast Groundfish which was prepared for amendment 11 to the FMP. This document may be requested from the Council office and is available http://www.nwr.noaa.gov/1sustfsh/efhappendix/page1.html

Rockfish

Pacific ocean perch (*Sebastes alutus*) are found from La Jolla (southern California) to the western boundary of the Aleutian Archipelago (Eschmeyer et al 1983, Gunderson 1971, Ito 1986, Miller and Lea 1972), but are common from Oregon northward (Eschmeyer et al 1983). Pacific ocean perch primarily inhabit waters of the upper continental slope (Dark and Wilkins 1994) and are found along the edge of the continental shelf (Archibald et al. 1983). Pacific ocean perch occur as deep as 825 m, but usually are at 100-450 m and along submarine canyons and depressions (NOAA 1990). Larvae and juveniles are pelagic; subadults and adults are benthopelagic. Adults form large schools 30 m wide, to 80 m deep, and as much as 1,300 m long (NOAA 1990). They also form spawning schools (Gunderson 1971). Juvenile Pacific ocean perch form ball-shaped schools near the surface or hide in rocks (NOAA 1990). Throughout its range, Pacific ocean perch is generally associated with gravel, rocky or boulder type substrate found in and along gullies, canyons, and submarine depressions of the upper continental slope (Ito 1986).

Pacific ocean perch winter and spawn in deeper water (>275 m), then move to feeding grounds in shallower water (180-220 m) in the summer (June-August) to allow gonads to ripen (Archibald et al. 1983, Gunderson 1971, NOAA 1990). Pacific ocean perch are slow-growing and long-lived. The maximum age has been estimated at about 90 years (ODFW, personal communication). Largest size is about 54 cm and 2 kg (Archibald et al. 1983, Beamish 1979, Eschmeyer et al. 1983, Ito 1986, Mulligan and Leaman 1992, NOAA 1990, Richards 1994). Pacific ocean perch are carnivorous. Larvae eat small zooplankton. Small juveniles eat copepods, and larger juveniles feed on euphausiids. Adults eat euphausiids, shrimps, squids, and small fishes. Immature fish feed throughout the year, but adults feed only seasonally, mostly April-August (NOAA 1990). Predators of Pacific ocean perch include sablefish and Pacific halibut.

Shortbelly rockfish (*Sebastes jordani*) are found from San Benito Islands, Baja California, Mexico to La Perouse Bank, British Columbia (Eschmeyer et al 1983, Lenarz 1980). The habitat of the shortbelly rockfish is wide ranging (Eschmeyer et al 1983). Shortbelly rockfish inhabit waters from 50-350 m in depth (Allen and Smith 1988) on the continental shelf (Chess et al. 1988) and upper-slope (Stull and Tang 1996). Adults commonly form very large schools over smooth bottom near the shelf break (Lenarz 1992). Shortbelly rockfish have also been observed along the Monterey Canyon ledge (Sullivan 1995). During the day shortbelly rockfish are found near the bottom in dense aggregations. At night they are more dispersed. (Chess et al 1988). During the summer shortbelly rockfish tend to move into deeper waters and to the north as they grow, but they do not make long return migrations to the south in the winter to spawn (Lenarz 1980).

Shortbelly rockfish are viviparous, bearing advanced yolk-sac larvae (Ralston et al 1996). Shortbelly rockfish spawn off California during January through April (Lenarz 1992). Larvae metamorphose to juveniles at 27 mm and appear to begin forming schools at the surface at that time (Laidig et al. 1991, Lenarz 1980). A few shortbelly rockfish mature at age 2, while 50% are mature at age 3 and nearly all are

mature by age 4 (Lenarz 1992). They live to be about 10 years old (Lenarz 1980, MacGregor 1986) with the maximum recorded age being 22 years (Lenarz 1992).

Shortbelly rockfish feed primarily on various life stages of euphausiids and calanoid copepods both during the day and night (Chess et al. 1988, Lenarz et al. 1991). Shortbelly rockfish play a key role in the food chain, as they are preyed upon by chinook and coho salmon, lingcod, black rockfish, hake, bocaccio, chilipepper, pigeon guillemots, western gull, marine mammals, and others (Chess et al. 1988, Eschmeyer et al. 1983, Hobson and Howard 1989, Lenarz 1980).

Widow rockfish (*Sebastes entomelas*) range from Albatross Bank of Kodiak Island to Todos Santos Bay, Baja California (Eschmeyer et al. 1983, 176, Miller and Lea 1972, NOAA 1990). Widow rockfish occur over hard bottoms along the continental shelf (NOAA 1990) Widow rockfish prefer rocky banks, seamounts, ridges near canyons, headlands, and muddy bottoms near rocks. Large widow rockfish concentrations occur off headlands such as Cape Blanco, Cape Mendocino, Pt. Reyes, and Pt. Sur. Adults form dense, irregular, midwater and semi-demersal schools deeper than 100 m at night and disperse during the day (Eschmeyer et al. 1983, NOAA 1990, Wilkins 1986). All life stages are pelagic, but older juveniles and adults are often associated with the bottom (NOAA 1990). All life stages are fairly common from Washington to California (NOAA 1990). Pelagic larvae and juveniles co-occur with yellowtail rockfish, chilipepper, shortbelly rockfish, and bocaccio larvae and juveniles off central California (Reilly et al 1992).

Widow rockfish are viviparous, have internal fertilization, and brood their eggs until released as larvae (NOAA 1990, Ralston et al 1996, Reilly et al 1992). Mating occurs from late fall-early winter. Larval release occurs from December-February off California, and from February-March off Oregon. Juveniles are 21-31 mm at metamorphosis, and they grow to 25-26 cm over 3 years. Age and size at sexual maturity varies by region and sex, generally increasing northward and at older ages and larger sizes for females. Some mature in 3 years (25-26 cm), 50% are mature by 4-5 years (25-35 cm), and most are mature in 8 years (39-40 cm) (28, NOAA 1990). The maximum age of widow rockfish is 28 years, but rarely over 20 years for females and 15 years for males (NOAA 1990). The largest size is 53 cm, about 2.1 kg (Eschmeyer et al. 1983, NOAA 1990).

Widow rockfish are carnivorous. Adults feed on small pelagic crustaceans, midwater fishes (such as age-1 or younger Pacific hake), salps, caridean shrimp, and small squids (Adams 1987, NOAA 1990). During spring, the most important prey item is salps, during the fall fish are more important, and during the winter widow rockfish primarily eat sergestid shrimp (Adams 1987). Feeding is most intense in the spring after spawning (NOAA 1990). Pelagic juveniles are opportunistic feeders and their prey consists of various life stages of calanoid copepods, and euphausiids (Reilly et al. 1992).

Canary Rockfish (*Sebastes pinniger*) are found between Cape Colnett, Baja California, and southeastern Alaska (Boehlert 1980, Boehlert and Kappenman 1980, Hart 1973, Love 1991,Miller and Lea 1972, Richardson and Laroche 1979). There is a major population concentration of canary rockfish off Oregon (Richardson and Laroche 1979). Canary primarily inhabit waters 91-183 m deep (Boehlert and Kappenman 1980). In general, canary rockfish inhabit shallow water when they are young and deep water as adults (Mason 1995). Adult canary rockfish are associated with pinnacles and sharp drop-offs (Love 1991). Canary rockfish are most abundant above hard bottoms (Boehlert and Kappenman 1980). In the southern part of its range, the canary rockfish appears to be a reef-associated species (Boehlert 1980). In central California, newly settled canary rockfish are first observed at the seaward, sand-rock interface and farther seaward in deeper water (18-24 m).

Canary rockfish are ovoviviparous and have internal fertilization (Boehlert and Kappenman 1980, Richardson and Laroche 1979). Off California, canary rockfish spawn from November-March and from January-March off Oregon and, Washington, (Hart 1973, Love 1991, Richardson and Laroche 1979). The age of 50% maturity of canary rockfish is 9 years; nearly all are mature by age 13 . The maximum length canary rockfish grow to is 76 cm (Boehlert and Kappenman 1980, Hart 1973, Love 1991). Canary rockfish primarily prey on planktonic creatures, such as krill, and occasionally on fish (Love 1991). Canary rockfish

feeding increases during the spring-summer upwelling period when euphausiids are the dominant prey and the frequency of empty stomachs is lower (Boehlert et al. 1989).

Chilipepper rockfish (*Sebastes goodei*) are found from Magdalena Bay, Baja California, to as far north as the northwest coast of Vancouver Island, British Columbia (Allen and Smith 1988, Hart 1973, Miller and Lea 1972). Chilipepper have been taken as deep as 425 m, but nearly all in survey catches were taken between 50 and 350 m (Allen and Smith 1988). Adults and older juveniles usually occur over the shelf and slope; larvae and small juveniles are generally found near the surface. In California, chilipepper are most commonly found associated with deep, high relief rocky areas and along cliff drop-offs (Love et al. 1990), as well as on sand and mud bottoms (MBC 1987). They are occasionally found over flat, hard substrates (Love et al. 1990). Love (Love 1981) does not consider this to be a migratory species. Chilipepper may migrate as far as 45 m off the bottom during the day to feed (Love 1981).

Chilipeppers are ovoviviparous, and eggs are fertilized internally (Reilly et al. 1992). Chilipepper school by sex just prior to spawning (MBC 1987). In California, fertilization of eggs begins in October ands spawning occurs from September to April (Oda 1992) with the peak being December to January (Love et al. 1990). Chilipepper may spawn multiple broods in a single season (Love et al. 1990). Females of the species are significantly larger, reaching lengths of up to 56 cm (Hart 1973). Males are usually smaller than 40 cm (Dark and Wilkins 1994). Males mature at 2 to 6 years of age and 50% are mature at 3 to 4 years. Females mature at 2 to 5 years with 50% mature at 3 to 4 years (MBC 1987). Females may attain an age of about 27 years whereas the maximum age for males is about 12 years (MBC 1987).

Larval and juvenile chilipepper eat all life stages of copepods and euphausiids, and are considered to be somewhat opportunistic feeders (Reilly et al. 1992). In California, adults prey on large euphausiids, squid, and small fishes such as anchovies, lanternfish and young hake (Hart 1973, Love et al. 1990). Chilipepper are found with widow rockfish, greenspotted rockfish, and swordspine rockfish (Love et al. 1990). Juvenile chilipepper compete for food with bocaccio, yellowtail rockfish, and shortbelly rockfish (Reilly et al. 1992).

Bocaccio rockfish (*Sebastes paucispinis*) are found in the Gulf of Alaska off Krozoff and Kodiak Islands, south as far as Sacramento Reef, Baja California (Hart 1973, Miller and Lea 1972). In survey catches, Allen and Smith (1988) found bocaccio to be most common at 100-150 m over the outer continental shelf. Sakuma and Ralston (1995) categorized bocaccio as both a nearshore and offshore species. Larvae and small juveniles are pelagic (Garrison and Miller 1982) and are commonly found in the upper 100 m of the water column, often far from shore (MBC 1987). Large juveniles and adults are semi-demersal and are most often found in shallow coastal waters over rocky bottoms associated with algae (Sakuma and Ralston). Adults are commonly found in eelgrass beds, or congregated around floating kelp beds (Love et al. 1990, Sakuma and Ralston). Young and adult bocaccio also occur around artificial structures, such as piers and oil platforms (MBC 1987). Although juveniles and adults are usually found around vertical relief, adult aggregations also occur over firm sand-mud bottoms (MBC 1987). Bocaccio move into shallow waters during their first year of life (Hart 1973), then move into deeper water with increased size and age (Garrison and Miller 1982).

Bocaccio are ovoviviparous (Garrison and Miller 1982, Hart 1973). Love et al. (1990) reported the spawning season to be protracted and last almost year-round (>10 months). Parturition occurs during January to April off Washington, November to March off northern and central California, and October to March off southern California (MBC 1987). Two or more broods may be born in a year in California (Love et al. 1990). The spawning season is not well known in northern waters. Males mature at 3 to 7 years with 50% mature in 4 to 5 years. Females mature at 3 to 8 years with 50% mature in 4 to 6 years(MBC 1987).

Larval bocaccio often eat diatoms, dinoflagellates, tintinnids, and cladocerans (Sumida and Moser 1984). Copepods and euphausiids of all life stages (adults, nauplii and egg masses) are common prey for juveniles (Sumida and Moser 1984). Adults eat small fishes associated with kelp beds, including other species of rockfishes, and occasionally small amounts of shellfish (Sumida and Moser 1984). Bocaccio

are eaten by sharks, salmon, other rockfishes, lingcod and albacore, as well as sea lions, porpoises, and whales (MBC 1987). Bocaccio directly compete with chilipepper and widow, yellowtail, and shortbelly rockfishes for both food and habitat resources (Reilly et al. 1992).

Splitnose rockfish (*Sebastes diploproa*) occur from Prince William Sound, Alaska to San Martin Island, Baja California (Miller and Lea 1972). Splitnose rockfish occur from 0-800 m, with most of survey catches occurring in depths of 100-450 m (Allen and Smith 1988). The relative abundance of juveniles (<21 cm) is quite high in the 91-272 m depth zone and then decreases sharply in the 274-475 m depth zone (Boehlert 1980). Splitnose rockfish have a pelagic larval stage and prejuvenile stage, and a benthic juvenile stage (Boehlert 1977). Benthic splitnose rockfish associate with mud habitats (Boehlert 1980). Young occur in shallow water, often at the surface under drifting kelp (Eschmeyer et al. 1983). The major types of vegetation juveniles are found under are Fucus sp. (dominant), eelgrass, and bull kelp (Schaffer et al 1995). Juvenile splitnose rockfish off southern California are the dominant rockfish species found under drifting kelp (Boehlert 1977).

Splitnose are ovoviviparous and release yolk sac larvae (Boehlert 1977). They may have two parturition seasons, or may possibly release larvae throughout the year (Boehlert 1977). In general, the main parturition season get progressively shorter and later toward the north (Boehlert 1977). Splitnose rockfish growth rates vary with latitude, being generally faster in the north. Splitnose mean sizes increase with depth in a given latitudinal area. Mean lengths of females are generally greater than males (Boehlert 1980). Off California, 50% maturity occurs at 21 cm, or 5 years of age, whereas off British Columbia 50% of males and females are mature at 27 cm (Hart 1973). Adults can achieve a maximum size of 46 cm (Boehlert 1980, Eschmeyer et al. 1983, Hart 1973). Females have surface ages to 55 years and section ages to 81 years.

Adult splitnose rockfish off southern California feed on midwater plankton, primarily euphausiids (Allen 1982). Juveniles feed mainly on planktonic organisms, including copepods and cladocerans during June and August. In October, their diets shift to larger epiphytic prey and are dominated by a single amphipod species. Juvenile splitnose rockfish actively select prey (Schaffer et al. 1995) and are probably diurnally active (Allen 1982). Adults are probably nocturnally active, at least in part (Allen 1982).

Yellowtail rockfish (*Sebastes flavidus*) range from San Diego, California, to Kodiak Island, Alaska (Fraidenburg 1980, Gotshall 1981, Lorz et al. 1983, Love 1991, Miller and Lea 1972, Norton and MacFarlane 1995). The center of yellowtail rockfish abundance is from Oregon to British Columbia (Fraidenburg 1980). Yellowtail rockfish are a common, demersal species abundant over the middle shelf (Carlson 1972, Fraidenburg 1980, Tagert 1991, Weinberg 1994). Yellowtail rockfish are most common near the bottom, but not on the bottom (Love 1991, Stanely et al. 1994). Yellowtail adults are considered semi-pelagic (Stanely et al. 1994, Stein et al. 1992) or pelagic which allows them to range over wider areas than benthic rockfish (Pearcy 1992). Adult yellowtail rockfish occur along steeply sloping shores or above rocky reefs (Hart 1973). They can be found above mud with cobble, boulder and rock ridges, and sand habitats; they are not, however, found on mud, mud with boulder, or flat rock (Love 1991, Stein et al. 1992). Yellowtail rockfish form large (sometimes greater than 1,000 fish) schools and can be found alone or in association with other rockfishes (Love 1991, Pearcy 1992, Rosenthal et al. 1982, Stein et al. 1992, Tagert 1991). These schools may persist at the same location for many years (Pearcy 1992).

Yellowtail rockfish are viviparous (Norton and MacFarlane 1995) and mate from October to December. Parturition peaks in February and March and from November-March off California (Westrheim 1975). Young-of-the-year pelagic juveniles often appear in kelp beds beginning in April and live in and around kelp, in midwater during the day, descending to the bottom at night (Love 1991, Tagert 1991). Male yellowtail rockfish are 34-41 cm in length (5-9 years) at 50% maturity, females are 37-45 cm (6-10 years) (Tagert 1991). Yellowtail rockfish are long-lived and slow-growing; the oldest recorded was 64 years old (Fraidenburg 1981, Tagert 1991). Even though they are slow growing, like other rockfish, they have a high growth rate when compared to other rockfish (Tagert 1991). They reach a maximum size of about 55 cm in approximately 15 years (Tagert 1991). Yellowtail rockfish feed mainly on pelagic animals, but are opportunistic, occasionally eating benthic animals as well (Lorz et al. 1983). Large juveniles and adults

eat fish (small hake, Pacific herring, smelt, anchovies, lanternfishes, and others), along with squid, krill, and other planktonic organisms (euphausiids, salps, and pyrosomes) (Love 1991, Phillips 1964, Rosenthal et al. 1982, Tagert 1991).

Shortspine Thornyhead (*Sebastolobus alascanus*) are found from northern Baja California to the Bering Sea and occasionally to the Commander Islands north of Japan (Jacobson and Vetter 1996). They are common from southern California northward (Love 1991). Shortspine thornyhead inhabit areas over the continental shelf and slope (Erickson and Pikitch 1993, Wakefield and Smith 1990). Although they can occur as shallow as 26 m (Eschmeyer et al. 1983), shortspine thornyhead mainly occur between 100 and 1400 m off Oregon and California, most commonly between 100-1000 m (Jacobson and Vetter 1996).

Spawning occurs in February and March off California (Wakefield and Smith 1990). Shortspine thornyhead are thought to be oviparous (Wakefield and Smith 1990), although there is no clear evidence to substantiate this (Erickson and Pikitch 1993). Eggs rise to the surface to develop and hatch. Larvae are pelagic for about 12-15 months. During January to June, juveniles settle onto the continental shelf and then move into deeper water as they become adults (Jacobson and Vetter 1996). Off California, they begin to mature at 5 years; 50% are mature by 12-13 years; and all are mature by 28 years (Owen and Jacobson 1992). Although it is difficult to determine the age of older individuals, Owen and Jacobson (Owen and Jacobson 1992) report that off California, they may live to over 100 years of age. The mean size of shortspine thornyhead increases with depth and is greatest at 1000-1400 m (Jacobson and Vetter 1996).

Benthic individuals are sit-and-wait predators that rest on the bottom and remain motionless for extended periods of time (Jacobson and Vetter 1996). Off Alaska, shortspine thornyhead eat a variety of invertebrates such as shrimps, crabs, and amphipods, as well as fishes and worms (Owen and Jacobson 1992)._ Longspine thornyhead are a common item found in the stomachs of shortspine thornyhead. Cannibalism of newly settled juveniles is important in the life history of thornyheads (Jacobson and Vetter 1996).

Longspine Thornyhead (*Sebastolobus altivelis*) are found from the southern tip of Baja California to the Aleutian Islands (Eschmeyer et al. 1983, Jacobson and Vetter 1996, Love 1991, Miller and Lea 1972, Smith and Brown 1983) but are abundant from southern California northward (Love 1991). Juvenile and adult longspine thornyhead are demersal and occupy the sediment surface (Smith and Brown 1983). Off Oregon and California, longspine thornyhead mainly occur at depths of 400-1400+ m, most between 600 and 1000 m in the oxygen minimum zone (Jacobson and Vetter 1996). Thornyhead larvae (Sebastolobus spp). have been taken in research surveys up to 560 km off the California coast (Cross 1987, Moser et al. 1993). Juveniles settle on the continental slope at about 600-1200 m (Jacobson and Vetter 1996). Longspine thornyhead live on soft bottoms, preferably sand or mud (Eschmeyer et al. 1983, Jacobson and Vetter 1996, Love 1991). Longspine thornyheads neither school nor aggregate (Jacobson and Vetter 1996).

Spawning occurs spawn in February and March at 600-1000 m (Jacobson and Vetter 1996, Wakefield and Smith 1990). Longspine thornyhead are oviparous and are multiple spawners, spawning 2-4 batches per season (Love 1991, Wakefield and Smith 1990). Eggs rise to the surface to develop and hatch. Floating egg masses can be seen at the surface in March, April, and May (Wakefield and Smith 1990). Juveniles (<5.1 cm long) occur in midwater (Eschmeyer et al. 1983). After settling, longspine thornyhead are completely benthic (Jacobson and Vetter 1996). Longspine thornyhead can grow to 38 cm (Eschmeyer et al. 1983, Jacobson and Vetter 1996, Miller and Lea 1972) and live more than 40 years (Jacobson and Vetter 1996). Longspine thornyhead reach the onset of sexual maturity at 17-19 cm TL (10% of females mature) and 90% are mature by 25-27 cm (Jacobson and Vetter 1996).

Longspine thornyhead are sit-and-wait predators (Jacobson and Vetter 1996). They consume fish fragments, crustaceans, bivalves, and polychaetes and occupy a tertiary consumer level in the food web. Pelagic juveniles prey largely on herbivorous euphausiids and occupy a secondary consumer level in the food web (Love 1991, Smith and Brown 1983). Longspine thornyhead are commonly seen in shortspine

thornyhead stomachs. Cannibalism in newly settled longspine thornyhead may occur because juveniles settle directly onto adult habitat (Jacobson and Vetter 1996). Sablefish commonly prey on longspine thornyhead.

Darkblotched rockfish *(Sebastes crameri*) are found from Santa Catalina Island off southern California to the Bering Sea (Miller and Lea 1972, Richardson and Laroche 1979). Off Oregon, Washington, and British Columbia it is primarily an outer shelf/upper slope species (Richardson and Laroche 1979). Distinct population groups have been found off the Oregon coast between lat. 44 30' and 45 20'N (Richardson and Laroche 1979). Adults occur in depths of 25-600 m and 95% are between 50 and 400 m (Allen and Smith 1988). Off central California, young darkblotched rockfish recruit to soft substrate and low (<1 m) relief reefs (Love et al. 1991). Darkblotched rockfish make limited migrations after they have recruited to the adult stock (Gunderson 1997).

Darkblotched rockfish are viviparous (Nichol and Pickitch 1994). Insemination of female darkblotched rockfish occurs from August to December, fertilization and parturition occurs from December to March off Oregon and California, primarily in February off Oregon and Washington (Hart 1973, Nichol and Pickitch 1994, Richardson and Laroche 1979). Females attain 50% maturity at a greater size (36.5 cm) and age (8.4 years) than males (29.6 cm and 5.1 years) (Nichol and Pickitch 1994). Adults can grow to 57 cm (Hart 1973). Pelagic young are food for albacore (Hart 1973).

Yelloweye rockfish *(Sebastes ruberrimus*) range from the Aleutian Islands, Alaska to northern Baja California; they are common from central California northward to the Gulf of Alaska (Eschmeyer et al. 1983, Hart 1973, Love 1991, Miller and Lea 1972, O'Connell and Funk 1986). Yelloweye rockfish occur in water 25-550 m deep; 95% of survey catches occurred from 50 to 400 m (Allen and Smith 1988). Yelloweye rockfish are bottom dwelling, generally solitary, rocky reef fish, found either on or just over reefs (Eschmeyer et al. 1983, Love 1991, O'Connell and Funk 1986). Boulder areas in deep water (>180 m) are the most densely-populated habitat type and juveniles prefer shallow-zone broken-rock habitat (O'Connell and Carlile 1993). They also reportedly occur around steep cliffs and offshore pinnacles (Rosenthal et al. 1982). The presence of refuge spaces is an important factor affecting their occurrence (O'Connell and Carlile 1993).

Yelloweye rockfish are ovoviviparous and give birth to live young in June off Washington (Hart 1973). The age of first maturity is estimated at 6 years and all are estimated to be mature by 8 years (Echeverria 1987). Yelloweye rockfish can grow to 91 cm (Eschmeyer et al. 1983, Hart 1973). Males and females probably grow at the same rates (Love 1991, O'Connell and Funk 1986). The growth rate of yelloweye rockfish levels off at approximately 30 years of age (O'Connell and Funk 1986). Yelloweye rockfish can live to be 114 years old (Love 1991, O'Connell and Funk 1986). Yelloweye rockfish are a large predatory reef fish that usually feeds close to the bottom (Rosenthal et al. 1988). They have a widely varied diet, including fish, crabs, shrimps and snails, rockfish, cods, sand lances and herring (Love 1991). Yelloweyes have been observed underwater capturing smaller rockfish with rapid bursts of speed and agility. Off Oregon the major food items of the yelloweye rockfish include cancroid crabs, cottids, righteye flounders, adult rockfishes, and pandalid shrimps (Steiner 1978). Quillback and yelloweye rockfish have many trophic features in common (Rosenthal et al. 1988).

Cowcod *(Sebastes levis)* occur from Ranger Bank and Guadalupe Island, Baja California to Usal, Mendocino County, California (Miller and Lea 1972). Cowcod range from 21 to 366 m (Miller and Lea 1972) and is considered to be parademersal (transitional between a midwater pelagic and benthic species). Adults are commonly found at depths of 180-235 m and juveniles are most often found in 30-149 m of water (Love et al. 1990). MacGregor (MacGregor 1986) found that larval cowcod are almost exclusively found in southern California and may occur many miles offshore. Adult cowcod are primarily found over high relief rocky areas (Allen 1982); they are generally solitary, but occasionally aggregate (Love et al. 1990). Solitary subadult cowcod have been found in association with large white sea anemones on outfall pipes in Santa Monica Bay (Allen 1982). Juveniles occur over sandy bottom and solitary ones have been observed resting within a few centimeters of soft-bottom areas where gravel or other low relief was found (Allen 1982). Although the cowcod is generally not migratory; it may move to

some extent to follow food (Love 1980). Cowcod are ovoviviparous, and large females may produce up to three broods per season (Love et al. 1990). Spawning peaks in January in the Southern California Bight (MacGregor 1986). Cowcod grow to 94 cm (Allen 1982). Larvae are extruded at about 5.0 mm (MacGregor 1986). Juveniles eat shrimp and crabs and adults eat fish, octopus, and squid (Allen 1982).

Bank rockfish (*Sebastes rufus*) are found from Newport, Oregon, to central Baja California, most commonly from Fort Bragg southward (Love 1992). Bank rockfish occur offshore (Eschmeyer et al. 1983) from depths of 31 to 247 m (Love 1992), although adults prefer depths over 210 m (Love et al. 1990). Observations of commercial catches indicate juveniles occupy the shallower part of the species range (Love et al. 1990). Bank rockfish are a midwater, aggregating species that is found over hard bottom (Love 1992), over high relief or on bank edges (Love et al. 1990), and along the ledge of Monterey Canyon (Sullivan 1995). It also frequents deep water over muddy or sandy bottom (Miller and Lea 1972). Spawning ranges from December to May (Love et al. 1990). Peak spawning in the Southern California Bight is January, in central and northern California it is February. Off California, bank rockfish are multiple brooders (Love et al. 1990). Females grow to a larger maximum size (50 cm) than males (44 cm), but grow at a slightly slower rate (Cailliet et al. 1996). Males reach first maturity at 28 cm, 50% maturity at 31 cm, and 100% at 38 cm. Females reach first maturity at 31 cm, 50% at 36 cm, and 100% maturity at 39 cm (Love et al. 1990). Bank rockfish are midwater feeders, eating mostly gelatinous planktonic organisms such as tunicates, but also preying on small fishes and krill (Love 1992).

Black rockfish (*Sebastes melanops*) are found from southern California (San Miguel Island) to the Aleutian Islands (Amchitka Island), and they occur most commonly from San Francisco northward (Hart 1973, Miller and Lea 1972, Phillips 1957, Stein and Hassler 1989). Black rockfish occur from the surface to greater than 366 m, however they are most abundant at depths less than 54 m (Stein and Hassler 1989). Off California, black rockfish are found along with the blue, olive, kelp, black-and-yellow, and gopher rockfishes (Hallacher and Roberts 1985) Adults are usually observed well up in the water column (Hallacher and Roberts 1985). The abundance of black rockfish in shallow water declines in the winter and increases in the summer (Stein and Hassler 1989). Densities of black rockfish decrease with depth during both the upwelling and non-upwelling seasons (Hallacher and Roberts 1985, PFMC 1996). Off Oregon larger fish seem to be found in deeper water (20-50 m) (Stein and Hassler 1989). Black rockfish off the northern Washington coast and outer Strait of Juan de Fuca exhibit no significant movement. However, fish appear to move from the central Washington coast southward to the Columbia River, but not into waters off Oregon. Movement displayed by black rockfish off the northern Oregon coast is primarily northward to the Columbia River (Culver 1986). Black rockfish form mixed sex, midwater schools, especially in shallow water (Hart 1973, Stein and Hassler 1989). Black rockfish larvae and young juveniles (<40-50 mm) are pelagic but are benthic at larger sizes (Laroche and Richardson 1980).

Black rockfish have internal fertilization and annual spawning (Stein and Hassler 1989). Parturition occurs from February-April off British Columbia, January-March off Oregon, and January-May off California (Stein and Hassler 1989). Spawning areas are unknown, but spawning may occur in offshore waters because gravid females have been caught well offshore (Dunn and Hitz 1969, Hart 1973, Stein and Hassler 1989). Black rockfish can live to be more than 20 years in age. The maximum length attained by the black rockfish is 60 cm (Hart 1973, Stein and Hassler 1989). Off Oregon, black rockfish primarily prey on pelagic nekton (anchovies and smelt) and zooplankton such as salps, mysids, and crab megalops. Off central California, juveniles eat copepods and zoea, while adults prey on juvenile rockfish, euphausiids, and amphipods during upwelling periods; during periods without upwelling they primarily consume invertebrates. Black rockfish feed almost exclusively in the water column (Culver 1986). Black rockfish are known to be eaten by lingcod and yelloweye rockfish (Stein and Hassler 1989).

Blackgill rockfish *(Sebastes melanostomus)* are distributed from Washington to Punta Abreojos (Love 1991, Moser and Ahlstom 1978). Adult blackgill rockfish are found offshore at depths of 219-768 m (Eschmeyer et al. 1983). Blackgill rockfish usually inhabit rocky or hard bottom habitats, along steep drop-offs, such as the edges of submarine canyons and over seamounts (Love 1991). However, they may also occur over soft-bottoms (Eschmeyer et al. 1983). Blackgill rockfish are a transitional species,

occupying both midwater and benthic habitats (Love et al. 1990), although they are rarely taken at more than 9 m above the bottom (Love 1991). Blackgill are considered an aggregating species (Love 1991).

Blackgill rockfish spawn from January-June (peaking in February) off southern California, and in February off central and northern California (Love 1991, Love et al. 1990, Moser and Ahlstom 1978). The largest blackgill rockfish on record is 61 cm (Eschmeyer et al. 1983, Love 1991, Love et al. 1990). Blackgill rockfish primarily prey on such planktonic prey as euphausids and pelagic tunicates, as well as small fishes (e.g., juvenile rockfishes and hake, anchovies and lantern fishes) and squid (Love et al. 1990).

Redstripe rockfish (Sebastes proriger) occur from San Diego, California to the Bering Sea (Allen and Smith 1988, Hart 1973, Miller and Lea 1972). Redstripe rockfish inhabits the outer shelf and upper slope and are most common between 100 and 350 m (Allen and Smith 1988). Adults are semi-demersal, while larvae and juveniles are pelagic to semi-demersal (Garrison and Miller 1982). Young redstripe rockfish can occur in estuaries (Kendall and Lenarz 1986). Redstripe rockfish are generally found slightly off the bottom over both high and low relief rocky areas (Starr et al. 1996). Redstripe rockfish are very sedentary, exhibiting little or no movement from a home habitat or range (Matthes et al. 1986).

Redstripe rockfish are ovoviviparous (Garrison and Miller 1982). Off Oregon, larvae are released between April and July, but later off northern and central California, during July through September (Kendall and Lenarz 1986). Redstripe rockfish may grow to reach 61 cm (Hart 1973). Larvae and juveniles of this species were found to feed primarily on copepods, their eggs, and copepod nauplii, as well as all stages of euphausiids (Kendall and Lenarz 1986). Food of adult redstripe rockfish consists of small fish such as anchovies, herring and early stages of other groundfish, as well as squid (Starr et al. 1996). Redstripe rockfish may compete for food and habitat resources with widow, squarespot , shortbelly, and canary rockfishes, as well as lingcod and spiny dogfish (Erickson et al. 1991).

Sharpchin rockfish (Sebastes zacentrus) occur from San Diego, California, to the Aleutian Islands, Alaska (Allen and Smith 1988). Sharpchin rockfish occur from 25 to 475 m, but about 96% occur from 100 to 350 m (Allen and Smith 1988). Sharpchin rockfish can occur over soft bottoms (Eschmeyer et al. 1983), but they apparently prefer mud and cobble substrate and are associated with boulder and cobble fields (Stein et al. 1992). Parturition occurs from March through July off Oregon and from May through June off northern and central California (Echeverria 1987). Shortratker rockfish can grow to 33 cm (Miller and Lea 1972).

Silvergrey Rockfish (Sebastes brevispinis) are found from Santa Barbara Island, southern California, to the Bering Sea (Allen and Smith 1988, Hart 1973). Silvergray rockfish are included in the shelf rockfish assemblage (Hart 1973, Nagtegaal 1983) and inhabit the outer shelf-mesobenthal zone (Allen and Smith 1988). They occur in depths from 0 to 375 m with 95% of survey catches taken in depths of 100 to 300 m (Allen and Smith 1988). Off Oregon young are probably released in late spring or summer (Hart 1973, Allen and Smith 1988). Off Washington young are released in June (Hart 1973). They achieve a maximum size of 71 cm (Hart 1973).

Yellowmouth rockfish (Sebastes reedi) occur from Sitka, Alaska to Point Arena, California. Yellowmouth rockfish occupy a depth range from 137-366 m (Miller and Lea 1972)) usually 275-366 m over rough bottom (Kramer et al. 1995). Off Oregon, yellowmouth rockfish release their young from February through June (150). Yellowmouth females mature at 33 cm or larger (9 years old), and males mature at lengths greater than 31 cm (9 years old). They grow to 54 cm and can live to 34 years of age (Hart 1973).

"Other Rockfish" are those rockfish species that do not have individual ABC/OYs. Life history descriptions of these species may be found in the Essential Fish Habitat West Coast Groundfish which was prepared for amendment 11 to the FMP. This document may be requested from the Council office and is available http://www.nwr.noaa.gov/1sustfsh/efhappendix/page1.html

"OTHER FISH" are those groundfish species that do not have individual ABC/OYs. Life history descriptions of these species may be found in the Essential Fish Habitat West Coast Groundfish which

was prepared for amendment 11 to the FMP. This document may be requested from the Council office and is available http://www.nwr.noaa.gov/1sustfsh/efhappendix/page1.html

3.2.2 Endangered Species

West Coast marine species listed as endangered or threatened under the Endangered Species Act (ESA) are discussed below in sections 3.2.5 (Marine Mammals,) 3.2.6 (Seabirds,) 3.2.7 (Sea Turtles,) and 3.2.8 (Salmon). Under the ESA, a species is listed as "endangered" if it is in danger of extinction throughout a significant portion of its range and "threatened" if it is likely to become an endangered species within the foreseeable future throughout all, or a significant portion, of its range. The following species are subject to the conservation and management requirements of the ESA:

Table 3.2.2.1. West Coast Endangered Species

Marine Mammals

Threatened:
- Steller sea lion (*Eumetopias jubatus*) Eastern Stock,
- Guadalupe fur seal (*Arctocephalus townsendi*), and
- Southern sea otter (*Enhydra lutris*) California Stock.

Seabirds

Endangered:
- Short-tail albatross (*Phoebastria (=Diomedea) albatrus*),
- California brown pelican (*Pelecanus occidentalis*), and
- California least tern (*Sterna antillarum browni*).

Threatened:
- Marbled murrelet (*Brachyramphs marmoratus*).

Sea Turtles

Endangered:
- Green turtle (*Chelonia mydas*)
- Leatherback turtle (*Dermochelys coriacea*)
- Olive ridly turtle (*Lepidochelys olivacea*)

Threatened:
- Loggerhead turtle (*Caretta caretta*)

Salmon

Endangered:
- Chinook salmon (*Oncorhynchus tshawytscha)*
  Sacramento River Winter; Upper Columbia Spring
- Sockeye salmon (*Oncorhynchus nerka)*
  Snake River
- Steelhead trout (*Oncorhynchus mykiss)*
  Southern California; Upper Columbia

Threatened:
- Coho salmon (*Oncorhynchus kisutch)*
  Central California, Southern Oregon, and Northern California Coasts
- Chinook salmon (*Oncorhynchus tshawytscha*)
  Snake River Fall, Spring, and Summer; Puget Sound; Lower Columbia; Upper Willamette; Central Valley Spring; California Coastal
- Chum salmon (*Oncorhynchus keta)*
  Hood Canal Summer; Columbia River
- Sockeye salmon (*Oncorhynchus nerka)*
  Ozette Lake
- Steelhead trout (*Oncorhynchus mykiss)*
  South-Central California, Central California Coast, Snake River Basin, Lower Columbia, California Central Valley, Upper Willamette, Middle Columbia, Northern California

3.2.3 Marine Mammals

The waters off Washington, Oregon, and California (WOC) support a wide variety of marine mammals. Approximately thirty species, including seals and sea lions, sea otters, and whales, dolphins, and porpoise, occur within the EEZ. Many marine mammal species seasonally migrate through West Coast waters, while others are year round residents. Table 3.2.3.1 identifies marine mammals of the WOC by community association.

There is limited information documenting the interactions of groundfish fisheries and marine mammals, but marine mammals are probably affected by many aspects of groundfish fisheries. The incidental take of marine mammals, defined as any serious injury or mortality resulting from commercial fishing operations, is reported to NMFS by vessel operators. In the West Coast groundfish fisheries, incidental take is infrequent and primarily occurs in trawl fisheries (Forney *et al.* 2000). Indirect effects of groundfish fisheries on marine mammals are more difficult to quantify due to a lack of behavioral and ecological information about marine mammals. However, marine mammals may be affected by increased noise in the oceans, change in prey availability, habitat changes due to fishing gear, vessel traffic in and around important habitat (e.g., areas used for foraging, breeding, raising offspring, or hauling-out), at-sea garbage dumping, and diesel or oil discharged into the water associated with commercial fisheries.

The Marine Mammal Protection Act (MMPA) and the ESA are the federal legislation that guide marine mammal species protection and conservation policy. Under the MMPA on the West Coast, NMFS is responsible for the management of cetaceans and pinnipeds, while the U.S. Fish and Wildlife Service (FWS) manages sea otters. Stock assessment reports review new information every year for strategic stocks (those whose human-caused mortality and injury exceeds the potential biological removal [PBR]) and every three years for non-strategic stocks. Marine mammals whose abundance falls below the optimum sustainable population (OSP) are listed as “depleted” according to the MMPA.

Fisheries that interact with species listed as depleted, threatened, or endangered may be subject to management restrictions under the MMPA and ESA. NMFS publishes an annual list of fisheries in the Federal Register separating commercial fisheries into one of three categories, based on the level of serious injury and mortality of marine mammals occurring incidentally in that fishery. The categorization of a fishery in the list of fisheries determines whether participants in that fishery are subject to certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements. The WOC groundfish fisheries are in Category III, indicating a remote likelihood of, or no known serious injuries or mortalities, to marine mammals.

Of the marine mammal species incidentally caught in WOC groundfish fisheries, the Steller sea lion is listed as threatened under the ESA, the northern elephant seal may be within their OSP range, and there is insufficient data to determine the status of the harbor seal, California sea lion, Dall’s porpoise, and Pacific white-sided dolphin relative to their OSP. None of these species are classified as strategic stocks under the MMPA. Based on its Category III status, the incidental take of marine mammals in the WOC groundfish fisheries does not significantly impact marine mammal stocks.

Table 3.2.3.1 Marine Mammal Communities of the WOC

Region	Nearshore	Shallow Shelf	Slope
Southern California	Harbor Porpoise Long-beaked dolphin Inshore bottlenose dolphin Minke whale Offshore bottlenosed dolphin Fin whale Dall's porpoise Risso's dolphin	Harbor Porpoise Inshore bottlenose dolphin N. right whale dolphin Bairds beaked whale Pacific white-sided dolphin Humpback whale Minke whale Offshore bottlenosed dolphin Killer whale Cuvier's beaked whale Fin whale Dall's porpoise Risso's dolphin Blue whale Short-finned pilot whale N. Right whale dolphin Mesoplodont beaked whales	Striped dolphin Offshore bottlenosed dolphin Cuvier's beaked whale Fin whale Blue whale N. Right whale dolphin Mesoplodont beaked whales
Central and Northern California	Harbor Porpoise Inshore bottlenose dolphin Killer whale Fin whale Dall's porpoise Blue whale	Harbor Porpoise Inshore bottlenose dolphin N. right whale dolphin Bairds beaked whale Pacific white-sided dolphin Humpback whale Minke whale Offshore bottlenosed dolphin Killer whale Cuvier's beaked whale Fin whale Dall's porpoise Risso's dolphin Blue whale Short-finned pilot whale N. Right whale dolphin Mesoplodont beaked whales	Sei whale Pygmy sperm whale Bryde's whale Offshore bottlenosed dolphin Killer whale Cuvier's beaked whale Fin whale Dall's porpoise Risso's dolphin Blue whale Short-finned pilot whale N. Right whale dolphin Mesoplodont beaked whales
Oregon - Brithish Coulmbia	Harbor Porpoise	Harbor Porpoise N. right whale dolphin Bairds beaked whale Pacific white-sided dolphin Humpback whale Minke whale Killer whale Fin whale Dall's porpoise Risso's dolphin Short-finned pilot whale N. Right whale dolphin	Bairds beaked whale Killer whale Cuvier's beaked whale Fin whale Dall's porpoise Risso's dolphin Mesoplodont beaked whales

3.2.4 Seabirds

Over sixty species of seabirds occur in waters off the coast of WOC within the EEZ. These species include: loons, grebes, albatross, fulmars, petrels, shearwaters, storm-petrels, pelicans, cormorants, frigate birds, phalaropes, skuas, jaegers, gulls, kittiwakes, skimmers, terns, guillemots, murrelets, auklets, and puffins. The migratory range of these species includes commercial fishing areas; fishing also occurs near the breeding colonies of many of these species.

Interactions between seabirds and fishing operations are wide-spread and have led to conservation concerns in many fisheries throughout the world. Abundant food in the form of offal (discarded fish and fish processing waste) and bait attract birds to fishing vessels. Of the gear used in the groundfish fisheries on the West Coast, seabirds are occasionally taken incidentally by trawl and pot gear, but they are most often taken by longline gear. Around longline vessels, seabirds forage for offal and bait that has fallen off hooks at or near the water's surface and are attracted to baited hooks near the water's surface during the setting of gear. If a bird becomes hooked while feeding on bait or offal, it can be dragged underwater and

drowned. Of the incidental catch of seabirds by longline groundfish fisheries in Alaska, northern fulmars represented about 66% of the total estimated catch of all bird species, gulls contributed 18%, Laysan albatross 5%, and black-footed albatross about 4% (Stehn *et al.* 2001). Longline gear and fishing strategies in Alaska are similar to some, but not all, of those used in WOC longline fisheries.

Besides entanglement in fishing gear, seabirds may be indirectly affected by commercial fisheries in various ways. Change in prey availability may be linked to directed fishing and the discarding of fish and offal. Vessel traffic may affect seabirds when it occurs in and around important foraging and breeding habitat and increases the likelihood of bird storms. In addition, seabirds may be exposed to at-sea garbage dumping and the diesel and oil discharged into the water associated with commercial fisheries. The FWS is the primary federal agency responsible for seabird conservation and management. Under the Magnuson-Stevens Act, NMFS is required to ensure fishery management actions comply with other laws designed to protect seabirds.

3.2.5 Sea Turtles

Sea turtles are highly migratory; four of the six species found in U.S. waters have been sighted off the West Coast. Little is known about the interactions between sea turtles and West Coast commercial fisheries. The directed fishing for sea turtles in WOC groundfish fisheries is prohibited, because of their ESA listings, but the incidental take of sea turtles by longline or trawl gear may occur. Sea turtles are known to be taken incidentally by the California-based pelagic longline fleet and the California halibut gillnet fishery. Because of differences in gear and fishing strategies between those fisheries and the WOC groundfish fisheries, the expected take of sea turtles by groundfish gear is minimal. The management and conservation of sea turtles is shared between NMFS and FWS.

Sea turtles may be also indirectly affected by commercial fisheries. Sea turtles are vulnerable to collisions with vessels and can be killed or injured when struck, especially if struck with an engaged propeller. Entanglement in abandoned fishing gear can also cause death or injury to sea turtles by drowning or loss of a limb. The discard of garbage at sea can be harmful for sea turtles, because the ingestion of such garbage may choke or poison them. Sea turtles have ingested plastic bags, beverage six-pack rings, styrofoam, and other items commonly found aboard fishing vessels. The accidental discharge of diesel and oil from fishing vessels may also put sea turtles at risk, as they are sensitive to chemical contaminates in the water.

3.2.6 Salmon

Salmon caught in the U.S. West Coast fishery have life cycle ranges that include coastal streams and river systems from central California to Alaska and oceanic waters along the U.S. and Canada seaward into the north central Pacific Ocean, including Canadian territorial waters and the high seas. Some of the more critical portions of these ranges are the freshwater spawning grounds and migration routes.

Chinook or king salmon (*Oncorhynchus tshawytscha*) and coho or silver salmon (*O. kisutch*) are the main species caught in Council-managed ocean salmon fisheries. In odd-numbered years, catches of pink salmon (*O. gorbuscha*) can also be significant, primarily off Washington and Oregon. Ocean salmon are caught with commercial and recreational troll gear. No other gears are allowed to take and retain salmon in the ocean fisheries. Small amounts of rockfish and other groundfish are taken as incidental catch in salmon troll fisheries.

NMFS issued Biological Opinions under the ESA on August 10, 1990, November 26, 1991, August 28, 1992, September 27, 1993, May 14, 1996, and December 15, 1999 pertaining to the effects of the groundfish fishery on chinook salmon (Puget Sound, Snake River spring/summer, Snake River fall, upper Columbia River spring, lower Columbia River, upper Willamette River, Sacramento River winter, Central Valley, California coastal), coho salmon (Central California coastal, southern Oregon/northern California coastal, Oregon coastal), chum salmon (Hood Canal, Columbia River), sockeye salmon (Snake River, Ozette Lake), and steelhead (upper, middle and lower Columbia River, Snake River Basin, upper

Willamette River, central California coast, California Central Valley, south-central California, northern California, southern California).

3.2.7 Nongroundfish Species Interactions

Coastal Pelagic Species (CPS) CPS are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. These species include: northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific (chub) mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*) and market squid (*Loligo opalescens*). These species are managed under the Coastal Pelagic Species Fishery Management Plan.

Sardines inhabit coastal subtropical and temperate waters and at times have been the most abundant fish species in the California current. During times of high abundance, Pacific sardine range from the tip of Baja California to southeastern Alaska. When abundance is low, Pacific sardine do not occur in large quantities north of Point Conception, California. Pacific (chub) mackerel in the northeastern Pacific range from Banderas Bay, Mexico to southeastern Alaska. They are common from Monterey Bay, California to Cabo San Lucas, Baja California, and most abundant south of Point Conception, California. The central subpopulation of northern anchovy ranges from San Francisco, California to Punta Baja, Mexico. Jack mackerel are a pelagic schooling fish that range widely throughout the northeastern Pacific, however much of their range lies outside the U.S. EEZ. Adult and juvenile market squid are distributed throughout the Alaska and California current systems, but are most abundant between Punta Eugenio, Baja California and Monterey Bay, Central California.

CPS are taken incidentally in the groundfish fishery. Incidental take is well documented in the at-sea and shore-based whiting fishery. Preliminary data for 2001 indicates approximately 321mt of jack mackerel, 469 mt of Pacific mackerel, and 55 mt of squid was incidentally taken in the at-sea whiting fishery. There is little information on the incidental take of CPS by the other segments of the fishery, however given CPS are not associated with the ocean bottom, the interaction is expected to be minimal.

Dungeness Crab The Dungeness crab (*Cancer magister*) is distributed from the Aleutian Islands, Alaska, to Monterey Bay, California. They live in bays, inlets, around estuaries, and on the continental shelf . Dungeness crab are found to a depth of about 180 m. Although it is found at times on mud and gravel, this crab is most abundant on sand bottoms; frequently it occurs among eelgrass. The Dungeness crab, which are typically harvested using traps (crab pots), ring nets, by hand (scuba divers) or dip nets, are incidentally taken or harmed unintentionally by groundfish gears.

Pacific Pink Shrimp Pacific pink shrimp (*Pandalus jordani*) are found from Unalaska in the Aleutian Islands to San Diego, California, at depths of 25 to 200 fm (46 to 366 m). Off the U.S. West Coast these shrimp are harvested with trawl gear from northern Washington to central California between 60 and 100 fm (110 to 180 m). The majority of the catch is taken off the coast of Oregon. Concentrations of pink shrimp are associated with well-defined areas of green mud and muddy-sand bottom. Shrimp trawl nets are usually constructed with net mesh sizes smaller than the net mesh sizes for legal groundfish trawl gear. Thus, it is shrimp trawlers that commonly take groundfish in association with shrimp, rather than the reverse.

Pacific Halibut Halibut (*Hippoglossus stenolepis*) belong to a family of flounders called Pleuronectidae. Halibut are usually found in deep water (40 to 200 m). The International Pacific Halibut Commission (IPHC) report, "Incidental Catch and Mortality of Pacific Halibut, 1962-2000" contains estimates of the incidental catches of halibut in the coastal trawl fisheries (groundfish and shrimp trawls). Estimates of incidental catches of halibut, based on the at-sea observer data collected in the Enhanced Data Collection Program conducted from 1995 through 1998, results in an estimated mortality level of legal-sized halibut incidentally taken in shrimp and groundfish trawl fisheries of 254 mt (560,000 pounds) for 2002.

Forage Fish Forage fish are small, schooling fish which serve as an important source of food for other fish species, birds and marine mammals. Examples of forage fish species are herring (*Clupea harengus*

pallasi), smelt (*Osmeridae*), anchovies, and sardine. Many species of fish feed on forage fish. Major predators of herring include Pacific cod (42% of diet), whiting (32%), lingcod (71%), halibut (53%), coho (58%), and chinook salmon (58%) (Environment Canada 1994). Many species of seabirds depend heavily on forage fish for food as well. Marine mammals consuming forage fish include: harbor seals, California sea lions, Stellar sea lions, harbor porpoises, Dall's porpoises, and Minke whales (Calambokidis and Baird 1994). Forage fish are most commonly found in nearshore waters and within bays and estuaries, although some do spend of their lives in the open ocean where they may be incidentally taken by groundfish gears, particularly in trawls. Preliminary data from the 2001 at-sea whiting fishery indicates the fishery encounters very minor amounts of forage fish species (Pacific herring less than 5 mt and less than 1 mt of smelt and sardines combined). There is little information on the incidental take of forage fish by the other segments of the fishery, however given they are not associated with the ocean bottom, the interaction is expected to be minimal.

Miscellaneous Species Little information is available on nongroundfish species incidentally captured in the groundfish fishery. Other than those species mentioned above, documentation from the whiting fishery indicates species such as American shad and walleye pollock are taken incidentally. American shad, introduced in 1885, have flourished throughout the lower Columbia River, producing a record run of 2.2 million fish in 1988 (ODFW and WDFW 1989). American shad was also taken in the shore-based whiting fishery. Walleye pollock are found in the waters of the Northeastern Pacific Ocean from the Sea of Japan, north to the Sea of Okhotsk, east in the Bering Sea and Gulf of Alaska, and south in the Northwestern Pacific Ocean along the Canadian and U.S. West Coast to Carmel, California.

3.3 SOCIO-ECONOMIC ENVIRONMENT

Protecting Overfished Species Within the Specifications and Management Measures Process. The major goal of management of the groundfish fishery throughout the 1990's was to prevent overfishing while achieving the OYs and providing year-round fisheries for the major species or species groups. One of the primary goals of the Pacific Coast groundfish FMP is to keep the fishery open throughout the entire year for most segments of the fishery (See FMP goals and objectives at section 2.0). Harvest rates are constrained by annual harvest guidelines, two-month or one-month cumulative period landings limits, individual trip limits, size limits, species-to-species ratio restrictions, bag limits in the recreational fisheries and other measures, all designed to control effort so that the allowable catch is taken at a slow rate that will stretch the season out to a full year. Cumulative period catch limits are set by comparing current or previous landings rates with the year's total available catch. Landings limits have been used to slow the pace of the fishery and stretch the fishing season out over as many months as possible, so that the overall harvest target is not reached until the end of the year.

By 2000, lower OYs and growing awareness of reduced productivity of the groundfish resource had made it apparent that the goal of a year-round fishery was no longer achievable for a number of species. In addition, new legislative mandates under the Magnuson-Stevens Act gave highest priority to preventing overfishing and rebuilding overfished stocks to their MSY levels. The National Standard Guidelines at 50 CFR 600.310 interpreted this as "weak stock management," which means that harvest of healthier stocks must be curtailed to prevent overfishing or to rebuild overfished stocks. To meet initial rebuilding requirements for the three species declared overfished in 1999, bocaccio, lingcod, POP, the Council developed a new management strategy that diverts effort off the sea floor of the continental shelf, where many of the overfished species are found. Overfished species protection measures initially applied in 2000 included more restrictive trip limits for continental shelf species, reduced seasons for commercial hook-and-line gear and recreational fisheries off central and southern California, and trawl gear restrictions limiting the species and quantities of groundfish that could be taken with trawl nets using footropes of greater than 8 inches in diameter.

These 2000 restrictions were relatively severe when compared against allowable landings limits in the 1990s. At the urging of their coastal communities, the governors of the three West Coast states asked the Secretary of Commerce, through NMFS, to declare the West Coast groundfish fishery a commercial

fishery failure. At the time, NMFS estimated that allowable landings limits in 2000 would reduce the commercial harvest value of West Coast groundfish by 25% from 1999 harvest levels. NMFS did declare the groundfish fisheries to be a commercial fishery failure in January 2000 (Dalton, 2000). In its declaration, NMFS cited the potential causes of the fishery resource disaster to be declining productivity in groundfish stocks associated with recently discovered oceanic regime shifts, advancements in scientific information about West Coast rockfish productivity that showed West Coast rockfish stocks to be generally less productive than many similar rockfish species worldwide. Since 2000, management measures intended to eliminate directed catch and minimize incidental catch of overfished species have increased in number and in restrictiveness. Although year-round groundfish landings opportunities continue to be available to some gears in some areas, fishing opportunities have been eliminated for many vessels.

Bycatch and Discard Accounting Groundfish management measures include provisions to reduce trip limit-induced discards and to account for those discards when monitoring harvest levels (OYs). Historically, NMFS and the Council have accounted for dead discards by estimating the amounts of certain species OYs that would be discarded dead, and then subtracting those amounts from the total catch OYs to get landed catch levels for those species. These discard rates have been expressed as a percent of total catch OY, so that a 16 percent discard rate for a species meant that 16 percent of that species' total catch OY would be deducted to derive that species' landed catch OY. Then, management measures were set to achieve the landed catch OY for that species.

Using discard rates was intended to account for dead fish either as dead discard or in landed catch. For all species except lingcod, sablefish, and nearshore rockfish species, it is assumed that discarded fish are generally dead when discarded or die soon after being discarded. Rockfish, particularly deepwater species, are severely stressed by decompression and temperature shock; however, lingcod discard mortality studies show about a 50 percent discard survival rate. There is no exact measure of discard amounts in most fisheries. Assumed amounts are taken into account to determine the true fishing mortality level and to prevent overall harvest from exceeding the OYs.

For the 2002 specifications and management measures, the Council's Groundfish Management Team (GMT) and Scientific and Statistical Committee (SSC) considered how to improve historic methods of setting discard rates in annual groundfish management. In particular, analysts looked at ways to characterize the ratios of overfished species occurrence in fisheries targeting health groundfish stocks. This new approach for re-evaluated discard rates for five overfished species: bocaccio, lingcod, POP, canary rockfish, and darkblotched rockfish. The GMT also revised discard rates for other rockfish and rockfish complexes as a result of the new analysis.

This new bycatch and discard analysis calculated the co-occurrence of each of the five overfished species with healthy targeted stocks. To make these co-occurrence calculations, the analysis evaluated data on a suite of trawl fishery target strategies (targeting the deepwater DTS complex, targeting arrowtooth flounder, etc). Each target strategy was separated into six two-month periods to set a baseline of co-occurrence rates of overfished stocks throughout an entire calendar year. Not surprisingly, the analysis found seasonal variations in the co-occurrence rates between healthy and overfished stocks. The Council then used these baseline co-occurrence rates to set the discard rates for each of the overfished species that were to be deducted from their respective OYs. Further, the Council recommended setting a combination of trip limits and seasons intended to concentrate targeting on healthy stocks during times and in areas where incidental catch of overfished species was lowest. For any inseason management changes made during the year, the bycatch rate analysis was intended to guide Council decisions to ensure that no alterations could be made to trip limits for healthy stocks that would result in greater overfished species discard. Additional information on the bycatch analysis used in setting the 2002 specifications and management measures is available in the preambles to the proposed and final rules implementing that regulatory package, at 67 FR 1555 (January 11, 2002) and 67 FR 10490 (March 7, 2002,) respectively. Discard rates for individual groundfish species or species groups are provided in the footnotes to Table 1 of this notice.

In setting its 2003 specifications and management measures, the Council's advisory bodies did not initially re-evaluate the data and methods used in the 2002 specifications bycatch analysis. However, in April 2003, NMFS revised the bycatch model and co-occurrence rates Revised co-occurrence rates were then used to guide Council decisions on inseason actions for the remainder of 2003.

To develop management measures for 2003 that would minimize bycatch and discard, the GMT and the SSC primarily discussed how best to modify the bycatch analysis so that it would account for varying fishing strategies by depth. As discussed above, the Council introduced new closed areas for 2003, intended to prevent vessels from fishing in waters where overfished species are commonly found. The Council and its advisory bodies expected that the new depth-based management measures would require adjusting the bycatch analysis to better recognize fishing patterns in the areas remaining open to fishing. Additionally, 2003 depth-related revisions to the bycatch analysis would have to account for expected effort shift by vessels that had historically operated in the formerly open areas.

To account for varying fishing patterns by depth, the GMT estimated the percentage of effort shift to the remaining open fishing areas, then estimated the percentage of target species OYs that would be taken in the nearshore and offshore open areas. Some deepwater species, such as sablefish, may only be taken in the offshore open area, with similar harvest patterns in the nearshore open area for primarily nearshore species. Other species, such as Dover sole, are distributed more broadly and may be taken in both the nearshore and offshore open areas. Once the GMT had set formulas to account for effort shift and target species availability in open fishing areas, the expected bycatch rates within those open areas was addressed.

Using the bycatch rates approved by the Council for the 2002 groundfish fisheries, the GMT analyzed bycatch rates for the same combinations of healthy and overfished stocks shown by depth and by two-month fishing period in trawl logbooks. Because the bycatch rates shown in trawl logbooks for the total fishing area were less conservative than those chosen by the Council for 2002 management, the GMT assumed that depth-specific bycatch rates shown in the trawl logbooks were also not adequately conservative to meet the Council's guidance on bycatch rates. Thus, the GMT adjusted depth-specific trawl logbook bycatch rates by the ratio between the Council's 2001/2002 selected rates for all areas and the logbook rates for all areas. From these adjustments, the GMT set new depth and fishing period-specific bycatch rates that were compatible with the more conservative all areas bycatch rates the Council set in 2002. In designing trip limits, season closures, and other management measures, the GMT crafted trip limit scenarios for target and bycatch species taken in the open areas that were calculated to keep the total catch (landed + discard) of healthy target species and overfished species below their respective OYs.

3.3.1 Depth-Based Management.

Since 1998, groundfish management measures have been shaped by the need to rebuild overfished groundfish stocks. There are over 80 species in the West Coast groundfish complex that mix with each other in varying degrees throughout the year and in different portions of the water column. Some species, like Pacific whiting, are strongly aggregated, making them easier to target with relatively little bycatch of other species. Conversely, other species like canary rockfish may occur in species specific clusters, but are also found co-occurring with a wide variety of other groundfish species. Over the past several years, groundfish management measures have been more carefully crafted to recognize the tendencies of overfished species to co-occur with healthy stocks at certain times and areas.

With the 2002 specifications and management measures, the Council introduced a new bycatch analysis model, discussed earlier, that allowed managers to set trip limits so that more abundant stocks could be strongly targeted in times when they were less likely to co-occur with overfished stocks. The 2002 management measures primarily varied by time (two-month period) and by north-south management area (north of Cape Mendocino, between Cape Mendocino and Point Conception, south of Point Conception, etc). For 2003, the Council has used a new management tool, depth based areas where fishing is

restricted. Depth-based areas are intended to prevent vessels from fishing in depths where overfished species commonly occur while still allowing some fishing for more abundant stocks in the open areas.

Depth based management restrictions for the continental shelf were first introduced on September 13, 2002 (67 FR 57973,) with an emergency rule that closed trawling in the months of September-December 2002 in waters north of 40°10' N. lat. (approximately at Cape Mendocino) at depths where darkblotched rockfish commonly occurs. At its June 2002 meeting, the Council had found that the darkblotched rockfish estimated total catch was expected to exceed the OY before the end of 2002. In order to protect darkblotched rockfish from overharvest while still allowing fisheries access to underharvested healthy stocks, the Council asked NMFS to implement an emergency rule that would allow trawl gear only shoreward of 100 fm (184 m) and offshore of 250 fm (461 m). NMFS reviewed and implemented the Council's request, revising the restrictions to allow fishing shoreward of 100 fm (184 m) only in October-December and offshore of 250 fm (461 mt) in September-December, to prevent overharvest of canary rockfish and darkblotched rockfish in September.

The September-December 2002 closure was intended to specifically protect darkblotched rockfish, which are commonly caught by trawl gear in waters of 70-250 fm (128-457 m) depth. In designing 2003 management measures, the Council considered depth restrictions that would provide protection for several overfished species. Different closed areas are provided for different gear types, as not all gear types encounter each overfished species at the same rate or in similar areas. POP, for example, is almost exclusively caught in trawl fisheries, whereas yelloweye rockfish tends to be caught by hook-and-line gear.

For the limited entry bottom trawl fisheries north of 40°10' N. lat., canary rockfish tends to be available in 20-200 fm (37-366 m) depths, with higher catches in more shallow areas during the summer. As mentioned earlier, darkblotched rockfish tends to be found in 70-250 fm (128-457 m). The closed areas for bottom trawl fisheries north of 40°10' N. lat. are expected to protect canary and darkblotched rockfish in areas where they have historically been taken by trawl fisheries. These closed areas are also expected to protect other northern continental shelf and slope overfished species, such as lingcod, widow rockfish, POP, and yelloweye rockfish. Large footrope bottom trawling would be prohibited shoreward of the closed areas. Midwater trawling, as defined at 50 CFR §660.322(b)(6) has been permitted within the closed areas for Pacific whiting, yellowtail and widow rockfish because these fishing strategies have historically encountered only small amounts of overfished species as bycatch. In addition, trawling with open access exempted gear for species other than groundfish (spot prawn off Oregon and pink shrimp north of 40°10' N. lat) has been permitted within the closed areas. However, the states require groundfish excluder devices to be used in the pink shrimp fishery.

In the limited entry bottom trawl and open access exempted trawl fisheries south of 40°10' N. lat., bocaccio tend to be found in depths of 45-160 fm (82-293 m) and the greatest number of bocaccio tend to be taken between 40°10' N. lat. and 34°27' N. lat. (Point Conception). Although darkblotched rockfish are considered a northern species, they are also found between 40°10' N. lat. and 38° N. lat. To protect these overfished species, bottom trawling has been prohibited in depths where these species have historically been taken. Midwater trawling, as defined at 50 CFR §660.322(b)(6), has been permitted within the closed areas only for widow rockfish and whiting. For all areas, large footrope bottom trawling has been prohibited shoreward of the closed areas. Small footrope trawls are less able to fish in the rocky habitat preferred by many of the overfished rockfish species. In addition to these depth restrictions, the Cowcod Conservation Areas (CCAs) has remain closed to fishing offshore of 20 fm (37 m).

North of Cape Mendocino, limited entry fixed gear and open access hook-and-line fisheries have a greater effect on yelloweye rockfish and a lesser effect on darkblotched rockfish than trawl gear fisheries. Thus, depth restrictions for these fisheries were designed to prevent hook-and-line gear from operating in depths where yelloweye rockfish are commonly found, 100 fm (183 m) and shallower. The 27 fm (49 m) contour occurs entirely in state waters off the state of Washington and commercial fishing for groundfish is prohibited in state waters off Washington, making an inshore closed area boundary moot for that state. Fishing has been permitted shoreward of the 27 fm (49 m) boundary off Oregon and northern California because this area tends to be inshore of the areas where overfished species occur.

South of 40°10' N. lat., limited entry fixed gear and open access fisheries has been primarily constrained by management measures to protect bocaccio. The Council recommended an exception to this prohibition for commercial vessels using hook-and-line gear with no more than 12 hooks per line and up to 1 lb (.45 kg) weight per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank. This type of gear is used by vessels fishing for Pacific sanddabs, an abundant species that does not usually co-occur with overfished species. In addition to these depth restrictions, the Cowcod Conservation Areas (CCAs) will remain closed to fishing offshore of 20 fm (37 m).

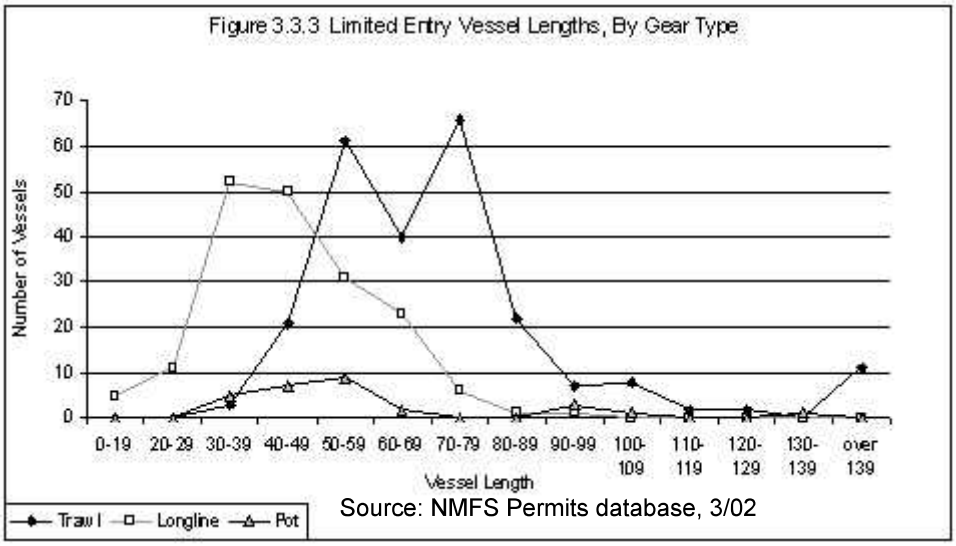
Recreational fisheries off Washington, Oregon, and California north of 40°10' N. lat. have been subject to fewer depth restrictions than the commercial fisheries, primarily because most recreational vessels tend to operate in the nearshore area inside state waters. Off Washington, recreational fishing for groundfish and halibut has been prohibited inside the Yelloweye Rockfish Conservation Area (YRCA,) a C-shaped closed area off the northern Washington coast. Coordinates for the YRCA have been defined at 50 CFR §660.304(d). Off Oregon and California north of 40°10' N. lat., recreational fishing for groundfish have been closed outside of 27 fm (49 m) because the yelloweye or canary rockfish recreational fisheries set asides are projected to be achieved.

As in past years, recreational fisheries off California south of 40°10' N. lat., has been constrained by depth in order to reduce catch of bocaccio and other overfished rockfish species. Recreational fishing for groundfish has been prohibited entirely in waters offshore of the 20 fm (37 m) depth contour. The Cowcod Conservation Areas (CCAs) will also remain closed to fishing offshore of 20 fm (37 m). Coordinates defining the CCAs have changed modestly to ensure that the CCAs comply with depth-based restrictions for waters off southern California. CCA coordinates has been defined at 50 CFR 660.304(c).

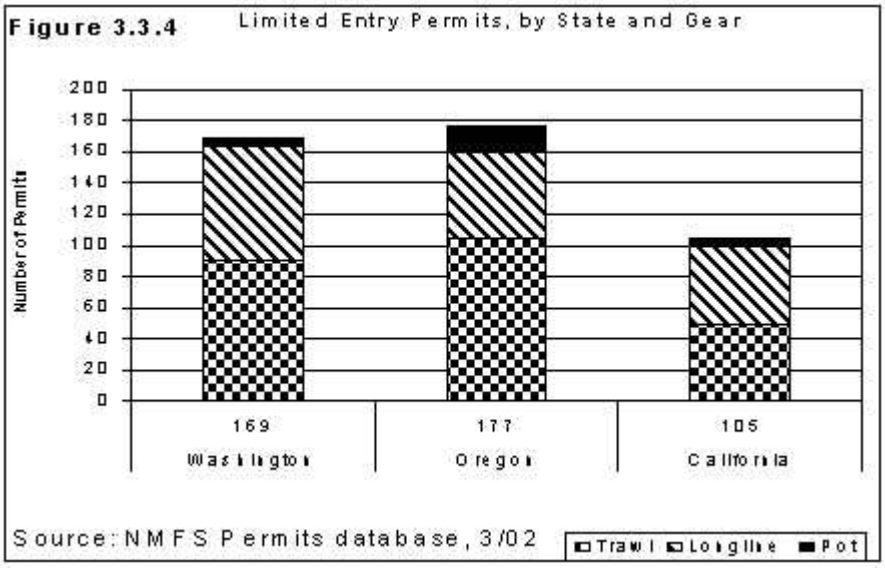
Many of the closed areas and boundary lines are generally described using a fathom contour line. All of these lines, except the 20 fm (37 m) contour off California south of 40°10' N. lat. and the 3 nautical mile state management line off California, are specifically defined in the regulations at IV.A. (19), using latitude/longitude waypoints. These waypoint coordinates provide straight-line boundaries that approximate the depth-contours to provide clarity to the closed area boundaries for enforcement purposes. To ensure that consistent nomenclature is used coastwide, an area closed to fishing for groundfish has been referred to as a "Groundfish Conservation Area" in general, regardless of whether the boundaries of that area change during the year. The YRCA and the CCA are defined by coordinates that are fixed throughout the year. The larger, gear or sector-specific closed areas described by depth contour boundaries for the 2003 fishing year have been referred to as "Rockfish Conservation Areas," or RCAs. For example, there are both a trawl RCA and a non-trawl RCA north of 40°10' N. lat. Boundaries for the RCAs are referred to as either the "inshore boundary," meaning the RCA boundary or borderline that is closest to shore, or the "offshore boundary," meaning the RCA boundary or borderline that is farthest offshore.

3.3.2 Commercial Fisheries

Limited Entry Groundfish Fisheries. The Pacific Coast groundfish fishery is a year-round, multi-species fishery that takes place off the coasts of Washington, Oregon, and California. Most of the Pacific Coast non-tribal, commercial groundfish harvest is taken by the limited entry fleet. The groundfish limited entry program was established in 1994 for trawl, longline, and trap (or pot) gears with Amendment 6 to the FMP; a license limitation program intended to restrict vessel participation in the directed commercial groundfish fisheries off Washington, Oregon, and California. The limited entry permits that were created through that program specify the gear type that a permitted vessel may use to participate in the limited entry fishery, and the vessel length associated with the permit. A vessel may only participate in the fishery with the gear designated on its permit(s) and may only be registered to a permit appropriate to the vessel's length. Since 1994, the Council has created further license restrictions for the limited entry fixed gear (longline and fish pot gear) fleet that restrict the number of permits useable in the primary sablefish fishery (Amendment 9) and that allow up to three sablefish-endorsed permits to be used per vessel (Amendment 14).



Source: NMFS Permits database, 3/02



During 2001, 424 vessels were registered to Pacific Coast groundfish limited entry permits, of these 257 were trawl vessels, 140 were longline vessels, 11 were trap vessels, and 16 vessels that were capable of using a combination of gears. Of the 424 vessels that were registered to limited entry permits in 2001, only 386 actually landed groundfish, this included 233 trawl vessels, 129 longline vessels and 24 pot vessels. Trawl vessels that landed whiting in the at sea sector were included in this estimate. It should be noted that the number of vessels registered for use with limited entry permits has decreased since the 2001 implementation of the permit stacking program for sablefish-endorsed limited entry fixed gear permits.

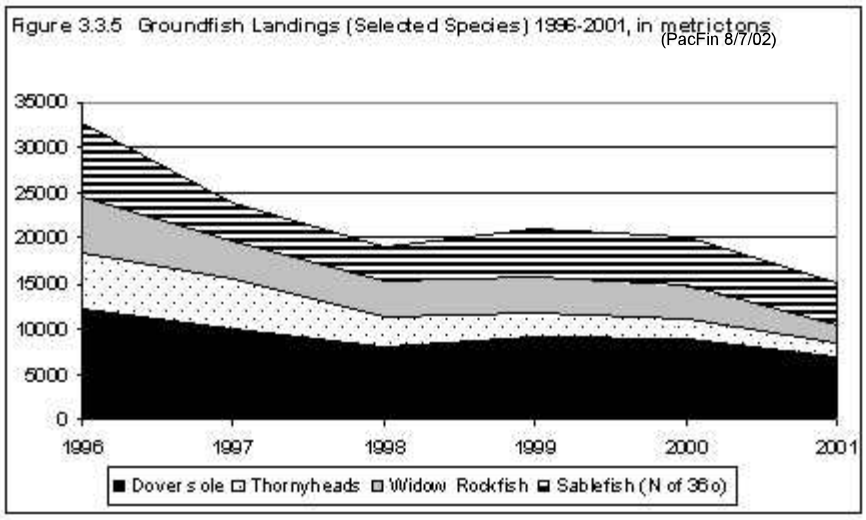
Table 3.3.2.1 Limited Entry Vessels by gear, 2001

	Gear group	Number of Limited Entry Vessels
Vessels registered to limited entry permits	Trawl (including catcher processors)	257
	Longline	140
	Pot	11
	Combined gears	16
	TOTAL	**424**
Vessels registered to limited entry permits that landed groundfish, including at-sea whiting, in 2001	Trawl (including catcher processors)	233
	Longline	129
	Pot	24
	TOTAL	**386**

Source: (Permits Database 10/02)

Because limited entry permits may be sold and leased out by their owners, the distribution of permits between the three states often shifts. In 2002, roughly 23 percent of the limited entry permits were assigned to vessels making landings in California, 39 percent to vessels making landings in Oregon, and 37 percent to vessels making landings in Washington. In 1999, this division of permits was approximately 41 percent for California, 37 percent for Oregon, and 21 percent for Washington. This change in state distribution of limited entry permits may also be due to the implementation of the fixed-gear permit stacking program. Vessels operating from northern ports may have purchased or leased sablefish-endorsed permits from vessels that had been operating out of California ports.

Limited entry fishers focus their efforts on many different species, with the largest landings by volume (other than Pacific whiting) being from the following species: Dover sole, arrowtooth flounder, petrale sole, sablefish, thornyheads, and yellowtail rockfish. There are 55+ rockfish species managed by the Pacific Coast groundfish FMP, of which seven species have been declared overfished in the past four years. Protective fisheries regulations intended to reduce the directed and incidental catch of overfished rockfish and other depleted species have significantly reduced the harvest of rockfish in recent years.



By weight, Pacific whiting represents the vast majority of West Coast groundfish landings. The whiting mid-water trawl fishery is a distinct component from the trawl groundfish trip limit fisheries. In 2001, whiting accounted for about 85 percent, by weight, of all commercial shore-based groundfish landings. Whiting is taken by treaty tribe catcher vessels delivering to a mothership (17.5% of total OY in 2002,) by non-tribal catcher vessels delivering to shore-based processing plants (42% of non-tribal OY,) by non-tribal catcher-vessels delivering to motherships (24% of non-tribal OY,) and by non-tribal catcher-processor vessels (34% of the non-tribal OY). In 2001, 29 catcher vessels delivered whiting to shore-based processing plants. This number is down from previous years, when the number of participating vessels was in the mid- to upper-30s. Some vessels move between the West Coast and Alaska fisheries; some remain entirely off Washington, Oregon, and California. In 2001, the v ast majority of whiting (about

73%) was landed in Oregon; Washington landings represented 24% of the total and California landings represented about 3.1%. Approximately 20 catcher vessels delivered to five motherships in 2001, and seven catcher-processor vessels participated in the whiting fishery. Also in 2001, four tribal catcher vessels delivered whiting to one mothership.

Catcher vessel owners and captains employ a variety of strategies to fill out a year of fishing. Fishers from the northern ports may fish in waters off of Alaska, as well as in the West Coast groundfish fishery. Others may change their operations throughout the year, targeting on salmon, shrimp, crab, or albacore, in addition to various high-value groundfish species, so as to spend more time in waters close to their communities. Factory trawlers and motherships fishing for or processing Pacific whiting off of the West Coast usually also participate in the Alaska pollock seasons, allowing the vessels and crews to spend a greater percentage of the year at work on the ocean. Commercial fisheries landings for species other than groundfish vary along the length of the coast. Dungeness crab landings are particularly high in Washington state, squid, anchovies, and other coastal pelagics figure heavily in California commercial landings, with salmon, shrimp, and highly migratory species like albacore more widely distributed, and varying from year to year.

Table 3.3.2.2. Number of at-sea whiting processors by sector, 1997 - 2001

	Catcher-processor	Mothership	Tribal
1997	10	6	1[1]
1998	7	6	1[1]
1999	6	6	1[1]
2000	8	6	1[1]
2001	7	5	1[1]

Summarized from NMFS NORPAC observer data
1/ this vessel participates in both the tribal and mothership fisheries

Table 3.3.2.3. Whiting landings (retained) by at-sea processing sectors, 1997 - 2000, metric tons

	Catcher-processor	Mothership	Tribal	All Sectors
1997	68,796	49,460	24,748	143,004
1998	69,692	49,705	23,846	143,243
1999	67,679	47,580	25,844	141,103
2000	67,649	46,710	6,251	120,610
2001	58,422	35,658	6,080	100,160

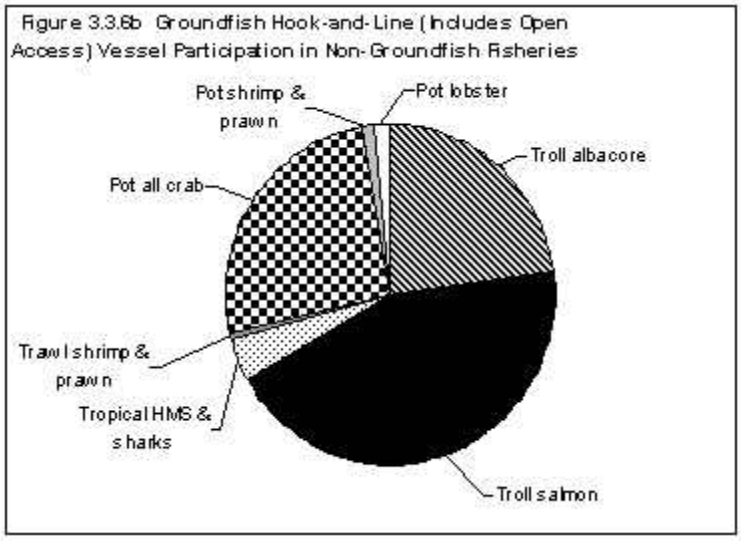
Summarized from NMFS NORPAC observer data

Table 3.3.2.4 Summary whiting catch and ex-vessel value by sector for the 2001 fishery

Number of motherships	Catch of Pacific whiting (mt) 1/	Range of Pacific whiting caught by catcher vessels (mt)	Average catch of Pacific whiting per catcher vessel (mt) 1/	Estimated Pacific whiting revenue per mothership ($1000) 2/	Estimated average Pacific whiting revenue per catcher vessel ($1000) 2/
5	35,823	5 - 4,339	1,327	553	106
Number of catcher processors		**Pacific whiting (mt) 1/**		**Estimated revenue per catcher processor for Pacific whiting ($1000) 2/**	
7		58,628		646	
Number of states with shoreside processors		**Catch of Pacific whiting (mt) 3/**		**Estimated revenue per state for Pacific whiting ($1000) 2/**	
3		73,326		1,886	
Number of tribal processors	**Catch of Pacific whiting (mt) 1/**	**Range of Pacific whiting caught by catcher vessels (mt)**	**Average catch of Pacific whiting per catcher vessel (mt) 1/**	**Estimated Pacific whiting revenue per mothership ($1000) 2/**	**Estimated average Pacific whiting revenue per catcher vessel ($1000) 2/**
1	6,080	881 - 1,900	1,517	469	117

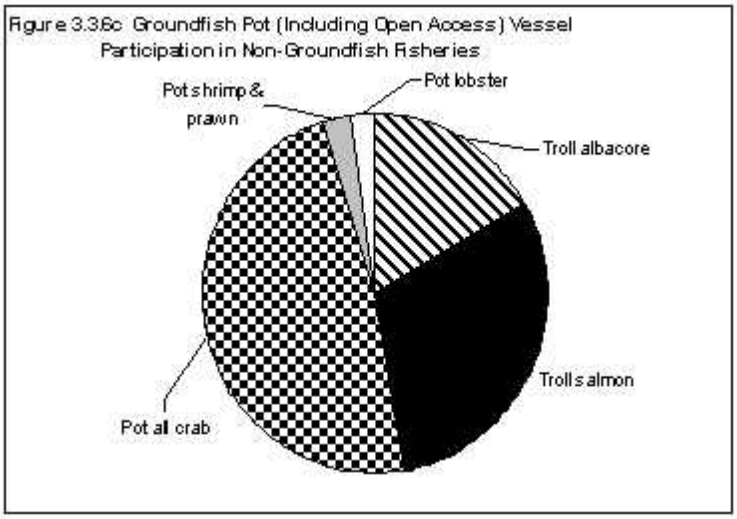
1/ The source of catch information was NORPAC observer data.
2/ The price ($.035/lb) of whiting was obtained from PacFin. It is the price for July 2001; July had the greatest number of whiting landings coastwide.
3/ The source of catch information was the report "Shoreside Whiting Observer Program: 2001" prepared by Steve Parker, Marine Resource Program, Oregon Department of Fish and Wildlife, Newport, Oregon, 97365.

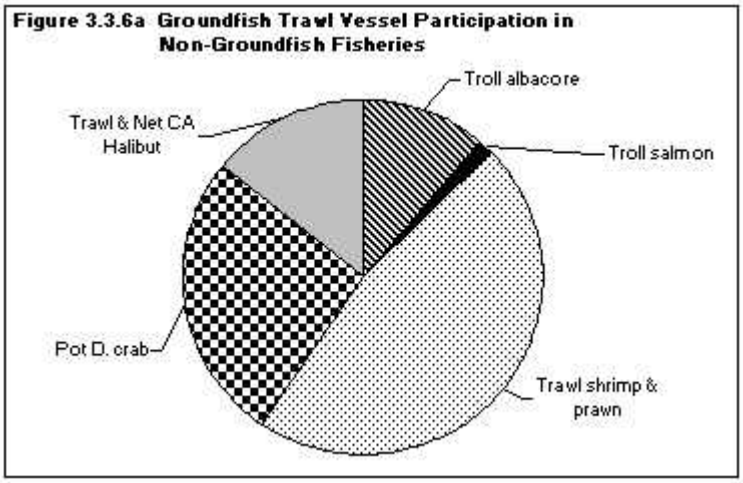
Figures 3.3.6a-c, based on data from an ongoing project by Council staff to create an economic profile of groundfish fishery participants, shows the approximate concentration of groundfish vessels in fisheries for non-groundfish West Coast species, 1994-1998. These pie charts exclude some non-groundfish fisheries (such as lobster, urchin, sea bass, and California gillnet complex) where participation by groundfish vessels was so minimal that a viewer could not reasonably see the corresponding portion of the pie chart. Data for these charts came from an ongoing Council staff project to create a socio-economic profile of groundfish fishery participants.



It is clear from these three charts that there is some degree of gear loyalty for groundfish vessels participating in non-groundfish fisheries. For example, a notable proportion of the non-groundfish fishery participation by groundfish trawl vessels occurs in the shrimp and prawn trawl fisheries. Similarly, the hook-and-line groundfish fisheries show high participation in the troll albacore and troll salmon fisheries. And, while all three gear groups

participate in pot fisheries for crab, groundfish pot vessels show the greatest percentage of gear group participation in pot fisheries for crab and other crustaceans.





Open Access Groundfish Fisheries. Unlike the limited entry sector, the open access fishery has unrestricted participation and is comprised of vessels targeting or incidentally catching groundfish with a variety of gears, excluding groundfish trawl gear. While the open access groundfish fishery is under federal management and does not have participation restrictions, some state and federally managed fisheries that land groundfish in the open access fishery have implemented their own limited entry (restricted access) fisheries or enacted management provisions that have affected participation in groundfish fisheries.

The commercial open access groundfish fishery consists of vessels that do not necessarily depend on revenue from the fishery as a major source of income. Many vessels that predominately fish for other species inadvertently catch and land groundfish. Or, in times and areas when fisheries for other species are not profitable, some vessels will transition into the groundfish open access fishery for short periods. The commercial open access fishery for groundfish is split between vessels targeting groundfish (*directed fishery*) and vessels targeting other species (*incidental fishery*). The number of unique vessels targeting groundfish in the open access fishery between 1995-1998 coastwide was 2,723, while 2,024 unique vessels landed groundfish as incidental catch (1,231 of these vessels participated in both) (SSC's Economic Subcommittee, 2000).

In the directed open access fishery, fishers target groundfish in the "dead" and/or "live" fish fishery using a variety of gears. The terms dead and live fish fisheries refers to the state of the fish when they are landed. The dead fish fishery has historically been the most common way to land fish. The dead fish fishery made up 80% of the directed open access landings by weight coastwide in 2001. More recently, the market value for live fish has increased landings of live groundfish. The other component of the open access fishery is the incidental catch of groundfish in fisheries targeting other species (e.g., shrimp, salmon, highly migratory species, squid). Combining both the directed and incidental fisheries, the commercial groundfish open access fishery is potentially very large and includes a variety of gear types.

Table 3.3.2.5. Open Access Fishery Landings in 1996 and 2001, by state, weight and value (PFMC 2002)

Open Access Sector	1996 landings by weight	2001 landings by weight
Coastwide Directed	3,291 mt	1,086 mt
Coastwide Incidental	802 mt	197 mt
Washington Directed	225 mt	66 mt
Washington Incidental	296 mt	28 mt
Oregon Directed	458 mt	237 mt
Oregon Incidental	384 mt	98 mt
California Directed	2,608 mt	776 mt
California Incidental	122 mt	70 mt

Landings, Revenue, and Participation by State Fisheries are generally distributed along the coast in patterns governed by factors such as location of target species, location of ports with supporting marine supplies and services, and restrictions/regulations of various state and federal governments. For the open access directed groundfish fishery, the majority of landings by weight that target groundfish occur off California. Oregon's directed groundfish open access fishery has the next highest landings, followed by Washington's. In the incidental groundfish fisheries, Oregon and California both have similar landings in their open access fisheries. Washington again has the lowest landings by weight of incidental groundfish (PFMC 2001e). Participation in "both directed and bycatch components of the open access fishery is much greater in California than in Oregon and Washington combined. For instance, in 1998, 779 California boats, 232 Oregon boats and 50 Washington boats participated in the directed fishery. In that same year, 520 California boats, 305 Oregon boats and 40 Washington boats participated in the bycatch fishery" (SSC's Economic Subcommittee, 2000).

Open access fisheries have been examined for their landings in the years 1996 and 2001, two randomly chosen years following the implementation of the limited entry program. Overall and in each individual state, open access landings decreased between 1996 and 2001. Federally, open access landings limits were sharply reduced between 1996 and 2001. Ex-vessel value for open access groundfish fisheries also decreased coastwide between 1996 and 2001. The directed fishery decreased from over $7 million in 1996 to under $5 million in 2001 and the incidental fishery decreased by half, from roughly $800,000 in 1996 to roughly $400,000 in 2001.

Table 3.3.2.3 Estimated Number of Open Access Incidental Catch Vessels by Fishery and the Number Estimated to Fish Within Any of the Conservation Areas

	Depth range of fishery	Number of vessels (2001) g/	Proportion estimated to operate within any of the conservation areas during 2003
North of 40°10 min			
Dungeness Crab	10- 50 fm c/ 10-40 fm c/	WA - 190 (232 permits) a/ OR - 306 (1999) a/ CA north - 330 a/	WA - 100% (190 -9 mo/year) OR - 50% est. (153 -9 mo/yr) CA - 50% est. (165- 8 mo/yr)
Pink shrimp- Trawl	25-200 fm a/	WA - 19 and OR - 84 a/	100% - 103
Spot prawn Trawl d/ Trap	80 -110 fm b/	WA-3 a/, OR-2 WA-10 a/, OR-10	100% - 25 (trap only WA)
Pacific Halibut	Primarily found 20-300fm	184 (238 including LE sablefish vessels) e/	100% - 184
Coastal Pelagic Species - wetfish	10-???	WA-11(44 permits) OR-15 (60 permits) CA -6 a/	WA-100% - 11 OR-50% est- 8 CA-50% est- 3
Sea cucumber	20-50 fm /f	OR- 0 (26 permits)	100% - 0
Other fisheries (Hagfish)	Fishery occurs out to 110 **	7 e/	100% - 7
South of 40°10 min			
CA Halibut Trawl Other	Primarily 20-50 fm, but some years inside 20 /f	92 h/ 356 h/	100%-448
Coastal Pelagic Species - squid	8-25 fm c/	115 a/ (197 permits c/)	20% est- 23
Coastal Pelagic Species - wetfish	10-???	107 a/	50% est - 54
Dungeness Crab	10-40 fm c/	central CA- 100 c/	50% est - 50
Gillnet complex	>50 fm some inside 20 fm f/	127 c/	80% est - 102 (6" footrope)
Pink shrimp - Trawl	25-200 fm a/	8 a/	100% - 8
Ridgeback prawn	25-88 fm a/	32 a/	100% -32
Sea cucumber	20-50 fm f/	13 a/	100% -13
Spot Prawn Trawl d/ Trap	25-267 fm a/ 100-180 fm (S. CA bight) a/	41 a/ 12 a/	100% - 53 (trap only)
CA Sheephead	<45 fm c/	124 c/	50% est - 62
Other fisheries	spiny lobster <70 fm c/	spiny lobster -251permits rock crab, sheep crab, surfperch, shark ???	50% est - 125 Others Unknown
Fisheries that occur both North and South of 40°10 min			
Salmon troll	??	1,194 a/	100% -1,194
Highly Migratory Species Longline Pole/line Gillnet/Driftnet Purse Seine		41 a/ 222 a/ 71 a/ 15 a/	0%
Total Number of Vessels (vessels that fish in multiple fisheries may be counted more than once)		**All commercial..... 4,098 All OA..... 3,840**	**All Commercial..... 3,013 All OA..... 2,881**

a/ Based the Pacific Coast Groundfish Open Access Fishery Report, June 2002
b/ Personal communication with ODF&W staff
c/ CA living Marine Resources: Status Report
d/ Most prawnfishing have been pot only in 2003
e/ IPHC personal communication
f/ 2003 annual specification and management measures EIS
g/ Vessels that fished in multiple fisheries may be represented more than one time
h/CDFG personal communications

3.3.3 Tribal Groundfish Fisheries.

In addition to the non-tribal commercial fisheries, members of the Makah, Quileute, Hoh, and Quinault tribes participate in commercial, and ceremonial and subsistence fisheries for groundfish off the Washington coast. In 1994, the U.S. government formally recognized that the four Washington Coastal Tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish, and concluded that, in general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes' usual and accustomed (U and A) fishing areas (described at 60 CFR 660.324). West Coast treaty tribes have formal allocations for sablefish, black rockfish, and Pacific whiting. Members of the four coastal treaty tribes participate in commercial, ceremonial, and subsistence fisheries for groundfish off the Washington coast. Participants in the tribal commercial fisheries operate off Washington and use similar gear to non-tribal fishers. Groundfish caught in the tribal commercial fishery pass through the same markets as non-tribal commercial groundfish catch.

In 2002, tribal sablefish longline fisheries were allocated 10% of the total catch OY (436.7 mt) and then were discounted 3% of that allocation for discard mortality, for a landed catch allocation of 424 mt. For the commercial harvest of black rockfish off Washington State, the treaty tribes have a harvest guideline of: 20,000 lb (9,072 kg) north of Cape Alava (48°09'30" N. lat.) and 10,000 lb (4,536 kg) between Destruction Island (47°40'00" N. lat.) and Leadbetter Point (46°38'10" N. lat.). In 1999 and 2000 32,500 mt of whiting was set aside for treaty Indian tribes on the coast of Washington state, resulting in a commercial OY of 199,500 mt for 2000. In 2001 and 2002 the landed catch OY declined to 190,400 mt and 129,600 mt, respectively, and the tribal allocations for those years were also reduced to 27,500 mt and 22,680 mt, respectively.

There are several groundfish species taken in tribal fisheries for which the tribes have no formal allocations. For some species on which the tribes have a modest harvest, no specific allocation has been determined. Rather than try to reserve specific allocations of these species, the tribes annually recommend trip limits for these species to the Council that accommodate modest tribal fisheries. Tribal trip limits for groundfish species without tribal allocations are usually intended to constrain direct catch and incidental retention of overfished species in the tribal groundfish fisheries.

The bulk of tribal groundfish landings occur during the March-April halibut and sablefish fisheries. Most continental shelf species taken in the tribal groundfish fisheries are taken during the halibut fisheries and most slope similarly taken during the tribal sablefish fisheries. Approximately one-third of the tribal sablefish allocation is taken during an open competition fishery, in which member vessels from the sablefish tribes all have access to this portion of the overall tribal sablefish allocation. The open competition portion tends to be taken during the same period as the major tribal commercial halibut fisheries in March and April. The remaining two-thirds of the tribal sablefish allocation are split between the sablefish tribes according to a mutually agreed-upon allocation scheme. Tribe-specific sablefish allocations are managed by the individual sablefish tribes, beginning in March and lasting into the autumn, depending on vessel participation management measures used. Participants in the halibut and sablefish fisheries tend to use hook-and-line gear, as required by the International Pacific Halibut Commission.

In addition to these hook-and-line fisheries, the Makah tribe annually harvests a whiting allocation using mid-water trawl gear. Since 1996, a portion of the U.S. whiting OY has been allocated to the Pacific Coast treaty tribes. The tribal allocation is subtracted from the whiting OY before allocation to the nontribal sectors. Since 1999, the tribal allocation has been based on a framework that is a sliding scale related to the U.S. whiting OY. To date, only the Makah tribe has fished on the tribal whiting allocation.

Table 3.3.3.1 Tribal Framework for Whiting Allocation, Adopted in 1999

U.S. Optimum Yield	Tribal Allocation
Up to 145,000 mt	17.5% of the U.S. OY
145,001 mt to 175,000 mt	25,000 mt
175,001 mt to 200,000 mt	27,500 mt
200,001 mt to 225,000 mt	30,000 mt
225,001 mt to 250,000 mt	32,500 mt
Over 250,000 mt	35,000 mt

Makah vessels fit with mid-water trawl gear have also been targeting widow and yellowtail rockfish with mid-water gear in recent years.

Table 3.3.3.2 Treaty Tribe Groundfish Landings, 1995-2001. In pounds, except for whiting, which is in mt.

Species	1995	1996	1997	1998	1999	2000	2001
Lingcod	2,162	1,616	1,555	3,477	4,086	4,054	6,757
Rockfish (general)	110,673	38,105	48,969	54,638	41,379	32,827	131
Rockfish (red)	211	137	87	619	1,067	431	2,141
Widow Rockfish					73	2,012	8,445
Yellowtail Rockfish	734	1,087	2,528	10,370	29,281	71,124	150,254
Shortspine thornyhead	15,476	7,408	12,483	4,916	7,984	8,705	11,008
Sablefish	1,177,704	1,128,795	1,078,875	634,512	812,511	958,490	907,399
Whiting (in metric tons)		15,000	24,840	24,509	25,844	6,251	6,080

Twelve western Washington tribes possess and exercise treaty fishing rights to halibut, including the four tribes that possess treaty fishing rights to groundfish. Specific halibut allocations for the treaty Indian tribes began in 1986. The tribes did not harvest their full allocation until 1989, when the tribal fleet had developed to the point that it could harvest the entire Area 2A TAC. In 1993, judicial confirmation of treaty halibut rights occurred and treaty entitlement was established at 50 percent of the harvestable surplus of halibut in the tribes' combined U and A fishing grounds. In 2000, the courts ordered an adjustment to the halibut allocation for 2000-2007, to account for reductions in the tribal halibut allocation from 1989-1993. For 2000 through 2007, the non-tribal fisheries will be transferring at least 25,000 lb per year to the tribal fisheries, for a total of 200,000 lb to be transferred to the tribal fisheries over that period. Tribal allocations are divided into a tribal commercial component and the year-round ceremonial and subsistence (C &S) component.

Tribal commercial halibut fisheries have historically started at the same time as Alaskan and Canadian commercial halibut fisheries, generally in mid-March. The tribal halibut allocation is divided so that approximately 80–85% of allocation is taken in brief open competition derbies, in which vessels from all halibut tribes compete against each other for landings. In 2002, three of these "unrestricted" openings were held in the spring: a 48-hour opening on March 18th, a 24-hour opening on April 2nd, and a 36-hour opening on April 30th. In addition to these unrestricted openings, 15-20% of the tribal halibut allocation is reserved for "restricted" fisheries, in which participating vessels are restricted to a per trip and per day poundage limit for halibut. Two restricted opening opportunities were available in 2002, from March 20th through April 19th and from May 5th through 9th. Similar to the unrestricted openings, these restricted openings are available for vessels from all halibut tribes.

Table 3.3.3.3 Treaty Tribe Halibut Allocations and Catches, Dressed Weight, 1996-2001

Year	Commercial Allocation	Commercial Catch	C and S Allocation	C and S Catch
1996	168,000	166,200	14,000	15,000
1997	230,000	228,500	15,000	14,800
1998	272,000	296,600	15,000	10,500
1999	256,000	271,500	10,000	10,500
2000	305,000	300,100	10,500	17,500
2001	406,500	411,600	17,500	16,000

3.3.4 Recreational Fishery

The recreational or sport fishery, where fishing is done for pleasure and not sale, has been part of the culture and economy of West Coast fishing communities for more than 50 years. Most recreational anglers use hook and line gear that is held directly in the hand or is attached to a pole or rod that is held in the hand. Recreational fishing occurs along the entire coast. Anglers fish from man-made structures such as piers, jetties, docks; natural shore areas; privately owned or rental boats; and charter vessels.

Licenses for the individual sport anglers are issued by the states of Washington, Oregon and California , with each state having its own specific requirements. Sport fishing licences are issued to residents and non-residents and may vary in cost by the level of participation (i.e.: 1-day, 2-day, annual), fishery, and fishing location. In addition, there may be a few special days each year where anyone can fish without a fishing license. In California, anyone 16 years and older must have a fishing license to take any kind of marine fish, except for persons angling from a public pier in ocean or bay waters. Only a basic fishing license is required for fishing in the ocean north of Point Arguello (34° 35' N. lat.) in Santa Barbara County, while an Ocean Enhancement Stamp is required for ocean fishing south of Point Arguello (except when fishing under authority of a two-day sport fishing license). One-day Pacific Ocean-only licenses, with or without an Ocean Enhancement Stamp are also issued. In Oregon, anyone 14 years or older is required to have a general angling license to fish for or land marine fish except when fishing for smelt or when they are a resident landowner or member of their immediate family and are angling on land they own and reside upon. In Oregon, all anglers, regardless of age, need a Combined Harvest Tag to fish for salmon, steelhead, sturgeon, and halibut. When angling in the Pacific ocean within 3 miles of shore between Cape Falcon, Oregon and Leadbetter point, Washington, either a resident Washington license or an Oregon license is valid. In Washington, a saltwater license is required for anyone who is 16 years or older and allows the license holder to fish for any species existing in saltwater, including salmon, steelhead, sturgeon, halibut, rockfish, etc.

Similarly, the states register and issue licenses for recreational boats owned and operated by state residents. The registration requirements and fees vary between the states and are based on type and size of vessel. In California, every sail-powered vessel over 8 feet in length (except wind surfing boards) and every motor driven boat not registered by the U. S. Coast Guard that is used in California state waters is subject to registration. In Oregon, the Oregon State Marine Board is responsible for registering and titling all recreational boating vessels. Registration and title fees and marine fuel taxes support boating facilities, marine law enforcement and boating safety education. All motorized boats, regardless of length or type, must be registered and sailboats 12 feet or longer must also be registered, In Oregon . In Washington state, motorized vessels and any vessel that is 16 feet or longer must be registered with the state.

Charter fishing as defined in section 2101(21a) of title 46, United States Code, is fishing from a vessel that is hired to carry passengers who engage in recreational fishing. In the Pacific Coast groundfish fishery, there are two categories of charter vessels, party boats (also called “Six-Packs”) and U.S.C.G. Certified passenger vessels (also called commercial passenger fishing vessels). The party boats are authorized by the U.S. Coast Guard to carry no more than six paying passengers. In general, these boats are smaller (although not necessarily small), are not required to pass rigorous Coast Guard inspection requirements and can be operated by skipper with a lower license rating. Commercial passenger fishing vessels are certified by the U.S. Coast Guard to carry a specific number of passengers. The vessels undergo a rigorous inspection every two years and must meet strict standards. Captains must also have a license to operate the vessel. In addition, if the certified boat is out for more than 12 hours, as in an over night trip, a second licensed captain must be on board. Table 3.3.4.1 shows the number of recreational charter vessels by port for 2001.

Within the recreational fishery, groundfish are both targeted and caught incidentally when other species such as salmon, are targeted. Until recent years, it was thought that commercial fisheries took the vast majority of marine fishery catch in the EEZ. However, recent data indicate that catches by the recreational fisheries are a significant portion of the total landings of some groundfish species. For some overfished

species, such as lingcod (55% of OY for recreational fishery), canary rockfish (34% of OY for recreational fishery), bocaccio (25% of OY for recreational fishery), and yelloweye rockfish (% of OY for recreational fishery), there are significant recreational catches. Table 3.3.4.2 shows the relationship of recreational and commercial total rockfish harvests, 1993-2001.

Table 3.3.4.1 Number of Recreational Charter Vessels Fishing in Ocean Waters in 2001, by Port

State	Port/area	Number of Recreational Charter Vessels
Washington	Neah Bay	15
	La Push	2
	Westport	32
	Ilwaco	28
	TOTAL	77
Oregon	Astoria	22
	Tillamook	51
	Newport	45
	Coos Bay	13
	Brookings	15
	Unknown	86
	TOTAL	232
California	Crescent City	1
	Eureka	4
	Fort Bragg	14
	San Francisco	67
	Monterey	33
	Conception (north)	129
	San Diego	95
	Unknown	72
	TOTAL	415
	TOTAL FOR ALL STATES	724

Table 3.3.4.2 Landings of All Rockfish by Commercial and Recreational Sectors 1993- 2001 (PacFin/RecFin)

Year	Recreational (mt)	Commercial (mt)	Total	Percent Recreational
1993	2,741	38,274	41,015	7%
1994	2,378	31,656	34,034	7%
1995	1,726	30,257	31,983	5%
1996	2,141	28,919	31,060	7%
1997	2,583	24,680	27,263	9%
1998	2,325	20,867	23,192	10%
1999	2,580	14,952	17,532	15%
2000	2,578	13,358	15,936	16%
2001	1,985	7,674	9,659	21%

Data source: PacFin data were extracted November 25, 2002

Marine recreational fishing on the West Coast has been on an increasing trend since 1996 (PFMC 2002). In 2001, 2.5 million marine recreational anglers took 5.2 million trips (1 million of these trips occurred in the federal EEZ) and are estimated to have caught 11,676 mt of fish of which 3,084 mt were groundfish. Most angling occurs during the summer months with fewer anglers fishing northward during the winter. Eighty eight percent of the trips in all ocean waters (state and federal waters) were made in California, followed by 9 percent in Washington, and 3 percent in Oregon. The number of participants has increased from 1.6

million in 1999 and 2.2 million in 2000. The number of trips has also increased from 3.1 million (0.64 million in the Federal EEZ) in 1999 and 4.6 million in 2000 (1.1 million in the Federal EEZ).

A portion of the increased recreational fishing effort is likely the result of longer salmon seasons that are associated with increased abundance and availability of salmon. Prior to 1996 when salmon seasons were shortened to protect declining populations, target effort shifts from recreational salmon fishing to groundfish targeting likely occurred. It is uncertain how much groundfish catch contributes to the overall incentive to engage in a recreational fishing. However, it seems likely that the frequency of groundfish catch on a trip adds to overall enjoyment and perceived value. Tables 3.3.4.3-3.3.4.5 identify the number of participants, fishing trips, and catch by fishing mode for 2001.

In southern California, most angling effort takes place from private/rental boats (43% of all ocean and trips or 49% of trips into the EEZ) and from charter vessels (27% of all ocean and trips or 51% of trips into the EEZ). Approximately 13 percent of the charter vessels take spear fishing divers. The recreational fishery in southern California targets a variety of species including: shelf and nearshore rockfishes (including California scorpion fish); lingcod; cabezon; California barracuda; yellowtail; ocean whitefish; tuna (including yellowfin and albacore); flatfish (including California halibut and sanddabs); kelp bass; barred sand bass, and spotted sandbass; white sea bass and California sheephead. Salmon are infrequently taken in southern California. Shelf rockfish, lingcod, California barracuda, yellowtail, ocean whitefish, and tunas are primarily taken by anglers aboard private/rental and charter vessels. The other species are taken by anglers from all modes. Divers primarily take nearshore rockfishes, lingcod, California sheephead, and Kelp bass.

In northern California, most of recreational angling effort takes place from private/rental boats and from shore (46% of all ocean and trips or 61% of trips into the EEZ). Spear fishing represents a very small amount of the effort with less than 2 percent of the charter vessels catering to divers. The recreational fishery in northern California primarily targets shelf and nearshore rockfishes, lingcod and salmon. In addition, cabezon, greenling, albacore, and flatfish (including sanddabs and California halibut) may be targeted. Shelf rockfish, lingcod, salmon, and albacore are primarily taken by charter vessels and private/rental boats. Greenling are primarily taken by private /rental boats and shore anglers. The other species are taken by anglers from all modes.

In Oregon, most recreational angling effort takes place from private/rental boats (62% of all ocean and trips or 67% of trips into the EEZ). The recreational fishery in Oregon primarily targets shelf and nearshore rockfishes, lingcod, greenling, Pacific halibut, salmon, cabezon, and albacore. Salmon and nearshore species such as greenling and cabezon are primarily taken by private/rental vessels, while the remaining species are more equally divided between the charter and private/rental boats.

In Washington, most recreational angling effort takes place from private/rental vessels (57% of all ocean trips or 58% of trips into the EEZ). The recreational fishery in Washington primarily targets shelf, and nearshore rockfishes, lingcod, greenling, Pacific halibut, salmon, sablefish, and albacore. Nearshore rockfish is primarily taken by charter vessels, while catch of the other species are more closely divided between the charter and private/rental boats.

Table 3.3.4.3 Estimated Number of Anglers in Ocean Fisheries 2001, by Fishing Mode, Thousands of Anglers (MRFSS)

	Coastal Residents	Non-coastal Residents	Out-of state Residents	Total
Southern California	1,054	15	185	1,255
Northern California	454	72	63	589
Oregon	312	30	84	426
Washington	571	36	49	655
Coastwide	2,390	154	n/a	2,544

Table 3.3.4.4 Estimated Number of Fishing Trips in Ocean Waters 2001 by Fishing Mode, Millions of Trips (EEZ only) (MRFSS)

	Party/charter Vessel	Private/Rental Vessel	Shore	Total
Southern California	0.99 (0.32)	1.39 (0.31)	0.86	3.24 (0.63)
Northern California	0.26 (0.09)	0.62 (0.14)	0.46	1.34 (0.23)
Oregon	0.10 (0.02)	0.31 (0.04)	0.09	0.50 (0.06)
Washington	0.05 (0.05)	0.08 (0.07)	0.01	0.14 (0.12)
Total	1.40 (0.47)	2.41 (0.56)	1.41	5.22 (1.03)

Table 3.3.4.5. Estimated Recreational Groundfish Catch in Ocean Waters 2001 by Fishing Mode, Metric Tons (MRFSS)

	Party/charter Vessel	Private/Rental Vessel	Total
Southern California	165	252	419
Northern California	728	945	1,675
Oregon	370	387	759
Washington	182	48	231
Total	1,445	1,632	3,084

Regulatory management measures available to manage the West Coast recreational groundfish catch include, but are not limited to, harvest guidelines, quotas, landing limits, frequency limits, gear restrictions, time/area closures, bag and size limits, permits, other forms of effort control. For 2003, recreational fisheries effort has been constrained to protect overfished species, particularly for lingcod, canary rockfish, bocaccio, and yelloweye rockfish. Washington, Oregon, and California will adopt through state regulation seasons, bag limits, and size limits to best fit the needs of their recreational fisheries in their states while also meeting conservation goals of the FMP.

For 2003, recreational fisheries management off Washington and Oregon have been structured to maintain low yelloweye rockfish catch, an overfished species primarily taken with hook and line gear. In reviewing the take of yelloweye rockfish in their recreational fisheries, the states of Washington and Oregon found that yelloweye rockfish is most frequently taken by vessels that travel offshore to target Pacific halibut. However, yelloweye rockfish are not taken while the vessel is fishing for halibut, but rather after the vessel has completed its halibut fishing and is headed for port. Recreational fishing restrictions proposed by California are intended to ensure that fishing mortality of bocaccio, canary rockfish, cowcod, and lingcod do not exceed limits associated with rebuilding these overfished species. Because California's recreational fisheries management measures were not sufficiently conservative to prevent their fisheries from exceeding their set asides for overfished rockfish species in 2001 and 2002, more restrictive measures have been used for 2003. South of 40°10' N. lat., where the significant majority of California recreational fisheries occur, recreational fishing have been closed entirely January through June and open only shoreward of 20 fm (37 m) July through December. The season was restructured to maximize recreational harvest opportunity while ensuring that nearshore groundfish, California scorpionfish, and lingcod shoreward of 20 fm (37 m) are not overharvested. Management measures adopted for 2003 are fully described in the proposed rule for 2003 Annual Specifications and Management Measures (January 7, 2003; 68 FR 936).

In addition to the leisure benefits that recreational anglers receive from participating in marine fisheries, they generate monetary benefits in the form of sales, income, and employment throughout the Pacific

Coast region. A wide variety of goods and services are purchased by anglers from sporting goods stores, speciality stores, bait and tackle shops, guide services, marinas, grocery stores, automobile service stations, and restaurants. The economic impacts of these purchases occur throughout the Pacific Coast economy and provide income and jobs in manufacturing, transportation industries, and service sectors. Across Washington, Oregon, and California, it is estimated that recreational anglers spent $4.5 billion on marine recreational fishing in 2000, with Southern California anglers spending the most ($2.5 billion). Nationwide, recreational fishing expenditures total $21 billion (Genter et al. 2001). The recreational fishery in Washington, Oregon, and California are associated with $254 Million in personal income and almost 10,000 jobs; the groundfish fishery represented $71 Million and 2,800 jobs, respectively or about 28% of the total (Genter et al. 2001) (Table 3.3.4.7).

Table 3.3.4.6 Recreational Fishery Harvest by Region for Party/charter Boats and Private/rental Boats, 2001, in Metric Tons (RecFin)

	Lingcod	Nearshore Rockfish	Shelf Rockfish	Other Nearshore Groundfish	Other Shelf Groundfish	Other Groundfish	Total Groundfish	Salmon	Halibut	Highly Migratory Species	Other	Total
Washington												
Charter	17	153	11	1	0	0	182	33	105	0	0	320
Private	15	20	10	3	0	0	48	38	103	0	0	189
Total	32	175	21	3	0	0	231	70	208	0	0	509
Oregon												
Charter	53	274	33	10	0	0	370	91	21	0	7	489
Private	60	282	12	33	0	0	387	1,108	3	11	176	1,685
Total	114	557	46	42	0	0	759	1,199	24	11	183	2,176
Northern California												
Charter	41	351	316	20	0	0	728	187	0	80	53	1,048
Private	90	290	111	439	15	0	945	1,384	0	387	1,048	3,764
Total	131	642	426	460	16	0	1,675	1,572	0	467	1,100	4,814
Southern California												
Charter	4	26	73	47	14	1	165	0	0	348	1,088	1,601
Private	19	15	112	78	26	2	252	0	0	411	1,907	2,570
Total	23	41	186	125	41	3	419	0	0	759	2,999	4,177
Coastwide												
Charter	115	804	433	78	14	1	1,445	311	126	428	1,148	3,458
Private	184	607	245	553	41	2	1,632	2,530	106	809	1,148	3,458
Total	**300**	**1,415**	**679**	**630**	**57**	**3**	**3,084**	**2,841**	**232**	**1,237**	**4,282**	**11,676**

Table 3.3.4.7. Total Pacific Coast Region Expenditures by Resident Status, 2000 (millions of dollars) (Gentner et al. 2001)

Pacific Coast Region	Total	Upper Bound	Lower Bound	Total	Upper Bound	Lower Bound
Trip Expend	**Residents ($)**			**Non- Residents ($)**		
Private Transportation	111	142	80	32	35	29
Food	75	81	70	13	14	12
Lodging	32	36	28	16	19	14
Public Transportation	3	4	2	49	60	38
Boat Fuel	46	51	40	3	4	2
Party/Charter Fees	64	70	58	8	9	6
Access/Boat Launching	10	11	9	1	2	1
Equipment Rental	8	10	7	7	9	5
Bait and Ice	31	34	27	3	3	2
Trip Sub-Totals	380	413	347	132	144	120
Annual Expenditures						
Rods and Reels	144	160	128			
Other Tackle	115	127	103			
Gear	27	30	23			
Camping Equipment	16	21	11			
Binoculars	5	6	3			
Clothing	19	23	15			
Magazines	5	5	4			
Club Dues	4	5	3			
License Fees	72	78	66			
Boat Accessories	371	462	279			
Boat Purchase	1,066	1,234	899			
Boat Maintenance	304	343	266			
Fishing Vehicle	1,326	1,669	983			
Fishing Vehicle Maintenance	285	332	239			
Vacation Home	98	161	34			
Vacation Home Maintenance	103	199	8			
Equipment and Durable Goods Sub-total	3,959	4,361	3,546			
All Sub-totals	4,339	4,743	3,925	132	144	120
Pacific Coast Region Total	4,471	4,875	4,057			

Table 3.3.4.8 Coastal Community Income Impacts for the Recreational Fishery by Area, 2001 (PFMS 2002)

Area		Charter ($1000s)	Private ($1000s)	Total ($1000s)	Jobs
Washington Coast	**Total**	$5,335	$3,285	$8,620	392
	Groundfish	$1,134	$385	$1,519	69
Oregon	**Total**	$6,382	$4,911	$11,293	514
	Groundfish	$4,227	$783	$5,011	228
California	**Total**	$99,616	$135,195	$234,811	8,899
	Groundfish	$43,983	$21,481	$64,465	2,468
Total	**Total**	$111,332	$143,392	$254,724	9,823
	Groundfish	$48,345	$22,649	$70,994	2,765

Processing Sector. With the exception of the portion of Pacific whiting catch that is processed at sea, all other Pacific Coast groundfish catch is processed in shore-based processing plants along the Pacific coast. By weight, 1998 commercial groundfish landings were distributed among the three states as follows: Washington, 13%; Oregon, 69%; California, 18%. By value, commercial groundfish landings are distributed among the three states as follows: Washington, 15%; Oregon, 43%; California, 41% (PFMC 2002). The discrepancies between the Oregon and California portions of the landings are expected because Oregon processors handle a relatively high percent of the shore-based whiting landings, a high volume, low value fishery. Conversely, California fishers land more of the low volume, high value species as a proportion of the total state-wide catch than Oregon fishers.

Shorebased Sector. Several thousand entities have permits to buy fish on the West Coast. Of these 1,780 purchased fish caught in the ocean area and landed on Washington, Oregon, or California state fish tickets in the year 2000 (excluding tribal catch) and 732 purchased groundfish. Larger buyers tend to handle groundfish more than smaller buyers. Of the 546 buyers purchasing in excess of $20,000 of West Coast landings, 59% bought groundfish. These 546 buyers bought 99% of all Council managed groundfish. Of the 1,234 buyers purchasing less than $20,000 from West Coast vessels, 33% bought groundfish. The number of buyers handling groundfish from trawl vessels is substantially lower than all of those handling groundfish. Only 17% (125) of all groundfish buyers (732) handled fish from trawl vessels. These 125 vessels comprise only 7% of all buyers (1,780). Buyers of trawl caught groundfish are important to nontrawl vessels as well, handling 60% (by value) of the groundfish caught by nontrawl vessels. Table 3.3.4.9 displays the number of buyers as compared to the groundfish buyers, grouped by total expenditures for the year 2000 (excluding at-sea whiting).

Table 3.3.4.9 Number of West Coast Buyers and Groundfish Buyers in 2000 (excluding at-sea whiting)

Buyers' Total Expenditures on West Coast Harvests	All Buyers	Nongroundfish Buyers	Groundfish Buyers	Groundfish Buyers as % of all Buyers
>$2 Million	21	2	19	90%
$1-$2 Million	33	14	19	58%
$300 Thousand - $1 Million	98	36	62	63%
$100-$300 Thousand	121	49	72	60%
$20-$100 Thousand	273	123	150	55%
$5 -$20 Thousand	372	224	148	40%
<$5 Thousand	862	600	262	30%
Total	1,780	1,048	732	41%

The largest buyers tend to handle trawl vessels more than smaller buyers. Of the 38 largest buyers of groundfish (those with purchases in excess of $1 million), 73% (28) bought from trawl vessels Seventy-eight percent of all groundfish purchases from trawl vessels go to the 28 trawl buyers with total purchases of all species in excess of $1 million. These 28 buyers also handle 39% of the exvessel value of the nontrawl purchases.

Table 3.3.4.10 Number of West Coast Groundfish Buyers in 2000 by gear group (excluding at-sea whiting)

Buyers' Total Expenditures on West Coast Harvests	Groundfish Buyers	Trawl caught groundfish buyers	Non-trawl caught groundfish buyers
>$2 Million	19	17	2
$1-$2 Million	19	11	8
$300 Thousand - $1 Million	62	33	29
$100-$300 Thousand	72	23	49
$20-$100 Thousand	150	19	131
$5 -$20 Thousand	148	11	137
<$5 Thousand	262	11	251
Total	732	125	607

Mid-size buyers tend to have greater importance for nontrawl vessels than for trawl vessels. Fifty percent of all nontrawl sales go to buyers with total purchases of between $20 thousand and $1 million, as compared to 22% for trawl vessels (PFMC 2002). Absent cost and exprocessor sale price data, very rough assumptions must be made to consider possible levels of dependence of processors on groundfish. However, it is assumed here that gross exvessel value of purchases is a rough indicator of relative levels of dependence. Large buyers of groundfish tend to have a lesser percentage of their overall purchases from groundfish than smaller buyers. Table 3.3.4.11 displays the value of purchases by west coast processors in 2000 (excluding at-sea whiting).

Table 3.3.4.11 Value of Purchases by west coast buyers in 2000 (PFMC 2002)

	All buyers	Groundfish buyers	
	Total purchases ($1,000)	Total purchases of all species ($1,000)	Total purchases of groundfish ($1,000)
>$2 Million	95,742	90,762	28,680
$1-$2 Million	45,343	25,851	8,585
$300 Thousand - $1 Million	56,115	36,527	11,278
$100-$300 Thousand	21,427	12,543	3,269
$20-$100 Thousand	12,881	7,297	2,023
$5 -$20 Thousand	3,989	1,519	501
<$5 Thousand	1,278	426	218
Total	236,775	174,926	54,554

At-Sea Sector. There are two classes of vessels in the at-sea processing sector of the whiting fishery, catcher-processors that harvest and process their own catch, and mothership vessels that process unsorted catch received from smaller catcher vessels. The processing vessels are large (>250 ft in length) and carry crews of 65-200, who mostly work in shifts to keep the factories operating day and night.

The first year of implementation of a license limitation program in the Pacific groundfish fishery was 1994. Vessels that did not initially qualify for a permit had to buy or lease one from qualifying vessels to gain access to the fishery. To harvest whiting, all at-sea catcher-processors had to purchase or lease permits. This changed the composition of the at-sea processing fleet considerably, increasing the number of motherships, because permits are not required for vessels that only process (PFMC 1998). Unlike catcher/processors and catcher vessels, motherships do not have permits to harvest groundfish in the WOC.

In 2001, 20 catcher vessels delivered whiting to 5 non-tribal mothership processors and 4 tribal catcher vessels delivered whiting to a single tribal mothership. Some vessels may deliver catch exclusively to motherships off Alaska and the West Coast, but in recent years, about half of the non-tribal vessels also delivered whiting to shore-based processing facilities in Washington, Oregon and California. Similarly, the tribal mothership also processes whiting in the non-tribal sector before the start of the tribal fishery. In 2001, 7 catcher/processors participated in the whiting fishery.

Since May 1997, when the Department of Justice approved allocation of whiting shares among the members of the Whiting Conservation Cooperative, the catcher-processor fishery has operated as a voluntary quota share program where each of the catcher-processor companies has agreed to take a specific share of the harvest. With harvests assured, the catcher-processors are able to operate more cautiously to avoid areas of salmon and rockfish abundance. The motherships, however, operate under more competitive conditions (first come first served) for their sector's allocation. The U.S. whiting allocation has been fully utilized by domestic processors since 1992.

Whiting is a high volume species, but it commands a relatively low price per pound. The at-sea processing vessels have onboard surimi production capacity and were initially designed to fish for pollock in the groundfish fisheries off Alaska. Because whiting is a similar species to pollock, harvesting and processing technology and equipment used in the Alaskan fisheries is also used for whiting. In addition, to surimi, most of these vessels have the capacity to produce frozen fillet blocks and have fish meal plants to process small whiting, incidentally caught groundfish species and fish offal.

Communities
Fishing communities, as defined in the Magnuson-Stevens Act, include not only the people who actually catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. In commercial fishing this may include boatyards, fish handlers, processors, and ice suppliers. Similarly, entities that depend on recreational fishing may include tackle shops, small marinas, lodging facilities catering to out-of-town anglers, and tourism bureaus advertising charter fishing opportunities. People employed in fishery management and enforcement make up another component of fishing communities.

Fishing communities on the West Coast depend on commercial and/or recreational fisheries for many species. Participants in these fisheries employ a variety of fishing gears and combinations of gears. Naturally, community patterns of fishery participation vary coastwide and seasonally, based on species availability, the regulatory environment, and oceanographic and weather conditions. Each community is characterized by its unique mix of fishery operations, fishing areas, habitat types, seasonal patterns, and target species. While each community is unique, there are many similarities. For example, all face danger, safety issues, dwindling resources, and a multitude of state and federal regulations.

Individuals make up unique communities with differing cultural heritages and economic characteristics. Examples include a Vietnamese fishing community of San Francisco Bay and an Italian fishing community of Southern California. Native American communities with an interest in the groundfish fisheries are also considered. In most areas, fishers with a variety of ethnic backgrounds come together to form the fishing communities within local areas, drawn together by their common interests in economic and physical survival in an uncertain and changing ocean and regulatory environment.

The EIS prepared for the 2003 Annual Specification and Management Measures looks closely at fishing communities and provides further information on the following: geographic distribution of commercial fishing fleet and revenue; geographic distribution of groundfish buyers; geographic distribution of personal income; dependence on and engagement in fishing and fishing-related activities; demographics, ethnic, and social characteristics social structure: networks, values, identity; impact on the built environment in fishing communities. As required by E.O. 12898 (Environmental Justice), low income and minority populations affected by this action are described in the EIS for the annual specifications and management process. In addition, supplemental county level economic and demographic information has been compiled for a general baseline description of West Coast fishing communities (PFMC 1999). This information may be accessed on the Council website (http://www.pcouncil.org/communities/comdoc.html).

Enforcement
Traditional fishery monitoring techniques include air and surface craft surveillance, declaration requirements, landing inspections, and analysis of catch records and logbooks. Current assets for patrolling offshore areas include helicopter and fixed wing aircraft deployed by the U.S. Coast Guard and state enforcement entities, one large 210 foot Coast Guard cutter, and smaller Coast Guard and state enforcement vessels. Only the aircraft and large cutter are suitable for patrolling the more distant offshore closed areas. The availability of Coast Guard assets may be
challenged by other missions such as Homeland Security and search and rescue.

State enforcement assets may be compromised by pessimistic budget outlooks for next year that threaten to reduce these assets as state programs are rationalized under an increasingly more conservative fiscal environment. In 2002, State enforced declaration requirements were used to increase the efficiency of at-sea patrols and improve enforcement, particularly in areas closed to certain gear types or fishing strategies. Under declaration programs, legal incursions into closed areas must be reported to state

enforcement authorities prior to fishing. This requirement is generally reserved for vessels that would otherwise appear to be fishing illegally when viewed from an at-sea patrol craft.

Shoreside enforcement activities complement at-sea monitoring and declaration requirements by inspecting recreational and commercial vessels for compliance with landing limits, gear restrictions, and seasonal fishery closures. State agencies are increasingly using dockside sampling as a means of assessing groundfish catch in recreational fisheries, which when combined with state and federal enforcement patrols at boat launches and marinas, provides a means of ensuring compliance with bag limits and fishery closures. Commercial landings are routinely investigated upon landing or delivering to buying stations or processing plants and can be tracked through fish ticket and logbook records.

4.0 IMPACTS OF THE ALTERNATIVES

Table 4.0.1 Summary of Biological and Socio-economic Impacts of the Monitoring System Alternatives from Sections 4.1 - 4.3.5

	Alternative 1 Status quo	**Alternative 2** Declarations	**Alternative 3** Basic VMS system with declaration reports	**Alternative 4** Upgraded VMS system with declaration reports	**Alternative 5** Observers with declaration reports
Biological indicators					
Fishing mortality -- Incidental catch of overfished species in the conservation areas	* Mortality based on fish ticket data with bycatch estimates from Hastie model	* Same as Alt. 1	* May be joined to data from observed trips to better estimate fishing mortality * Available for all trawl and fixed gears	* May be joined to data from observed trips to better estimate fishing mortality * Available for all trawl and fixed gears	* Observer catch composition data likely to be used for estimating total catch by species over large geographical area regardless of gear. Not available in real time.
Ability to understand effort shifts --To project impacts on juveniles, other fishery resources, or habitat	* Would continue to use unverified trawl logbook data for fishing location * Logbook data is not currently available from gears other than trawl	* Declaration reports may be used to estimate the number of vessels/trips in conservation area	* Accurate harvest location data over large geographical area for both trawl and fixed gears	* Same as Alt. 3	* Can be used to verify harvest location * Length and age structure data may be collected to understand total catch of juveniles * Observer data may be used to estimate incidental catch of other fishery resources
Socio-economic indicators					
Availability of information for enforcement -- for efficiency in the use of enforcement resources	* Continue to use limited air and surface craft	* Same as Alt. 1 plus * Aid in identifying vessels legally fishing in conservation areas	* Same as Alt. 1 and 2 plus * May act as deterrent * May be used to target landing and at-sea inspections *May be used to increase efficiency of surveillance patrols * May benefit homeland security activities * May be used as basis for enforcement action	* Same as Alt. 3 plus * 2-way communications allow for at-sea reporting of potential violations * Real-time data allow enforcement to respond to infractions	* May act as deterrent * Observer data could be used to verify vessel activity * May be used as basis for enforcement action
Availability of information for management -- for measuring the effectiveness of management measures	* Continue to use fishing logbooks to understand fishing location in relation to restrictions	* Same as Alt. 1 plus * Can be used to improve general understanding of depth ranges in which fisheries occur, particularly those fisheries currently without logbooks	* Same as Alt. 2 plus * Accurate harvest location data over large geographical area regardless of gear may be used to assess effectiveness of management regime * May be used in conjunction with observer data to improve bycatch management	* Same as Alt. 3	* Catch composition data would be available to assess bycatch and total catch levels in relation to OYs

The effects on harvesters, processors, and communities from more management regime	* Would likely result in more constrained harvest levels as compared to other alternatives, resulting in lost employment and fish for processors	* Similar to Alt. 1	* Most likely to maintain the integrity of conservation areas and allow higher harvest levels on healthy stocks and thereby provide processors with fish and employment opportunity	* Same as Alt. 3	* May allow fishery to sustain higher harvest levels on healthy stocks and thereby provide processors with fish and employment opportunity
Cost burden -- initial and long-term	* Would likely constrain the use of liberal management regimes that allow vessels to target healthy stocks in depth-based areas where overfished species are less likely to be taken incidentally	* Annual cost to transmit declaration report $24 per vessel (5 min/rpt- 12 time per year)	* Same as Alt. 2 * Allows the use of more liberal management regime where vessels can target healthy stocks in areas where overfished species are less likely to be taken incidentally * Capital costs would be $1,550-$3,800 ($800 unit may be approved by NMFS) unless unit was leased or paid for by NMFS * Installation costs: $65.50-$125.50 * Transmission cost: $1.67-$5/ fishing day - at 10 fishing days per mo cost would be $200- $600 per yr * Additional costs: $348 -$1,098 per year (declarations, maintenance, deprecation)	* Allows the use of more liberal management regime where vessels can target healthy stocks in areas where overfished species are less likely to be taken incidentally * Capital costs would be $2,750-$5,295 unless unit was leased or paid for by NMFS * Installation costs: $65.50-$405.50 * Transmission cost: $1-$3.5/ fishing day - 10 fishing days per mo the cost would be $120-$450 per year * Additional costs: $943 -$1,892 per year (declarations, maintenance, deprecation)	* If a direct pay system similar to the at-sea Pacific whiting fishery is used, for each day the observer is on the vessel the cost to the vessels would be $300/day. Training and debriefing costs would be an additional $1200/observer. * Including the costs of sampling equipment or infrastructure needed to support an increased number of observers and their data would likely increase the daily rate by 30% * Paying observer salaries would not be economically feasible for most vessels
Safety of human life -- search and rescue efficiency	* Varies between vessels due to fishing locations, equipment available on vessels, and how well equipment is maintained * When fishing opportunity is reduced and profits are marginal, vessels may display more risk prone behavior and may not adequately maintain equipment and vessels	* Same as Alt. 1	* Distress signal may reduce response time in emergency	* Same as Alt. 3 plus * 2-way communication can increase communications regarding vessel safety and medical issues	* Same as Alt. 1
Average per vessel VMS related costs	$0	$0	Year 1 - $2,163 -$5,623 Subsequent years - $548-$1,698	Year 1 - $3,878 -$7,607 Subsequent years - $1,063-$2,342	$0

4.1 Physical Impacts

Physical impacts associated with fishery management actions generally result from changes to the physical structure of the benthic environment as a result of fishing practices. This action pertains to a program that is expected to provide information needed to monitor fishing locations in relation to time area closures. There are no distinguishable differences in physical impacts between the alternatives. The physical impact of the proposed actions are not expected to be different from the status quo alternative (Issue 1, monitoring systems, Alternative 1). This is because the alternatives are for monitoring systems and are intended to monitor fishing activities that were adopted for the 2003 fishery and are already occurring under status quo. The Environmental Impact Statement prepared for the 2003 Annual Specifications and Management Measures addresses the physical impacts on the environment under the status quo alternative (PFMC 2002).

4.2 Biological Impacts

This section forms the analytic basis for comparing possible direct and indirect biological impacts across the alternatives. Direct effects are caused by the action and occur at the same time and place, while indirect effects occur later in time and are further removed in distance from the direct effects (40 CFR 1508.27). The impacts of each alternative on one or more components of the biological environment are discussed in sections 4.2.1 through 4.2.3 below.

4.2.1 Fishing mortality - incidental catch of overfished species

Direct effects on fishing mortality include the removal of target and non-target species (incidental catch) from the environment. Because this rulemaking would implement a program to monitor fishing location in relation to time-area closures, no direct biological impacts are expected to result from any of the alternatives. However, if the integrity of the closed areas are not adequately maintained, harvest assumptions could be inaccurate resulting in indirect effects such as unaccounted for removals. This is especially a concern for overfished species with low OYs.

For 2003, the Council sought a management strategy that would allow fishing to continue in areas and with gears that can harvest healthy stocks with little incidental catch of the low abundance or overfished species. The 2003 management measures are intended to keep harvests of overfished species within the OYs established for rebuilding. Large scale depth related areas, referred to as rockfish conservation areas, have been used to prohibit both commercial and recreational fishing across large portions of the continental shelf. Depth-based management lines have been used to define the conservation areas.

Depth-based management measures are gear-specific. Gear-specific measures are necessary, because the various overfished species are not encountered at the same rate by the different gear types. Prohibiting or restricting the use of a gear type that a particular overfished species is vulnerable to will reduce the incidental catch and keep the total catch of that species from exceeding the OY, while providing fishing opportunity for more abundant stocks in times and areas where incidental catch and discard of the depleted stocks is lowest.

The fishing mortality level (total catch level) for each species is the sum of retained catch and discarded catch (incidental or targeted catch that is not retained and landed by the vessel). To monitor the attainment of an OYs, the total catch level must be estimated for each species or species group. There is no exact measure of discard amounts in most fisheries. For all species except lingcod, sablefish, and nearshore rockfish species, it is assumed that discarded fish are dead or die soon after being returned to the sea. At the beginning of 2003, NMFS continued to use a 16 percent rate for estimating canary rockfish, bocaccio, and POP discards. For lingcod and darkblotched rockfish, NMFS continued to use a 20 percent rate for estimating discards. The preamble of the 2002 Annual Specifications and Management Measures (March 7, 2002, FR 10490) describes in full how discard rates have been derived. For 2003, depth-related discard assumptions have been made (detailed in the preamble of the proposed

rule for the 2003 Annual Specifications and Management Measures; January 7, 2003, 68 FR 936). The revised discard assumptions reflect the areas where vessel activity is expected to occur rather that where they historically operated. Data collected in the groundfish observer program (an ongoing information collection on catch composition with estimates of discarded catch) were further analyzed in 2003 with the intent of further refining discard assumptions to improve estimates of total catch. In April 2003, NMFS revised the bycatch model and co-occurrence rates Revised co-occurrence rates were then used to guide Council decisions on inseason actions for the remainder of 2003.

If the integrity of the closed areas cannot be maintained, the risk of exceeding an OY is increased, with the risk being greatest for species that the closed areas are intended to protect. Incursions into the conservation areas and the use of prohibited gear types could result in higher catch of the protected species than had been estimated in discard assumptions. If the true discard rates are higher than the discard assumptions used to estimate total catch, the OYs could unknowingly be exceeded. If the OYs are substantially exceeded, the stocks ability to rebuild could be impaired. If a "rebuilding deficit" is created for an overfished stock, because the OY is exceeded, the stock may not be able to recover within the specified rebuilding time. For stocks in the precautionary zone (B25%-B40%) the stock biomass could be further reduced, leading to an overfished status.

The risk of exceeding the OYs for overfished species is greatest under Issue 1, Alternative 1, the status quo alternative. Under Issue 1, Alternative 1, total catch estimates would continue to be based on landings data combined with discarded catch estimates that are based on assumptions that reflect fishing effort in open areas, and enforcement would continue to use limited air and surface craft to identify incursions into the closed areas. Enforcement efforts would not be as effective in deterring incursions under Issue 1, Alternative 1 than could be expected under Issue 1, Alternatives 2 through 5. This is because considerable time may be spent investigating fishing vessels that appear on the enforcement vessel's radar whether they are legitimately fishing in the conservation areas or not. Issue 1, Alternative 2, declarations, has slightly less risk of exceeding the OYs for a given species than Issue 1, Alternative 1, yet it has more risk than Issue 1, Alternatives 3, 4 or 5. This is because declaration reports can be used to aid enforcement in identifying vessels that are legally fishing within conservation areas, and may deter some vessels from unlawfully fishing in conservation areas and with prohibited gears. However, the utility of declarations (Issue 1, Alternative 2) in identifying illegal fishing activity is minimal.

The risk of exceeding the OYs is lowest under Issue 1, Alternatives 3 and 4 in which VMS systems and declarations are required. One of the major benefits of VMS is its deterrent effect. If fishing vessel operators know that they are being monitored and that a credible enforcement action will result, then the likelihood of a vessel using a prohibited gear in a conservation area is significantly diminished. In addition, data collected with a VMS system can be used to better understand the distribution of fishing effort. Little is known about fishing patterns by depth in the Pacific Coast groundfish fishery, this is especially true for the non-trawl gears. How effort will shift to the remaining open fishing areas as a result of the 2003 management measures and the creation of the depth-based conservation areas needs to be understood to effectively estimate total catch and monitor the attainment of OYs.

If effort data collected through a VMS system can be joined with discard data from observed fishing trips, managers may be able to make more accurate estimates of total catch by species. Because VMS data is available in realtime, fishery managers may be better able to monitor the attainment of OYs during the season. As with Issue 1, Alternative 2, declaration reports would be required from any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, to identify their intent to fish within a conservation area specific to their gear type, in a manner that is consistent with the conservation area requirements. Declaration reports would aid enforcement in sorting out vessels that were legally fishing within conservation areas from those that were not, therefore, declaration reports may deter some vessels from fishing in restricted areas with prohibited gears. In the long-term, VMS would be expected to have a positive indirect effect on fishing mortality by providing fisheries managers with information needed to minimize the risks of exceeding the OYs for overfished species. Issue 1, Alternative 5, observers, would provide fishing location and catch composition data, that would allow fisheries

managers to better understand total catch by species. Observer data is not expected to be available in realtime (observer data may become more rapidly available over time, but not early during the development of data systems and catch estimation methods)., and may be delayed considerably. Monitoring the attainment of OYs with observer data only is not expected to be as effective under this alternative as it would be under Issue 1, Alternatives 3 and 4. Issue 1, Alternative 5 is not expected to be as effective of a deterrent as Issue 1, Alternatives 3 and 4, because observer scientific duties may conflict with the observer's availability to verify positions. In addition, human error in reporting incorrect positions is increased under Issue 1, Alternative 5. The preferred alternative under Issue 1 is Alternative 3.

Issue 2, coverage, would apply if Issue 1, Alternatives 3, 4, or 5 were selected. Coverage refers to that portion of the overall fishing fleet that would be required to have VMS or observers on board in order to participate in the fishery. Issue 2, Alternative 5, would require all limited entry, open access, and recreational charter vessels to carry VMS or an observer regardless of where they fish. This alternative would be most beneficial in estimating fishing mortality in the long-term because it would provide the most amount of information on fishing location and effort by the largest number of participants. Landed catch estimates are available from the states, however, at this time there is very little data (observer or otherwise) from open access vessels and from recreational fishing vessels) on the amounts and types of catch that is discarded. In the short-term, using effort data obtained from a VMS system to estimate total catch and to monitor the attainment of OYs will be limited until more data becomes available. Issue 2, Alternative 4, would apply to all commercial and recreational charter fishing vessels that operate within the conservation areas. This group would not include vessels that fish shoreward (nearshore areas) or seaward of the conservation areas and is therefore a slightly smaller group than Issue 2, Alternative 5. Issue 2, Alternative 3 is very similar to Issue 2, Alternative 4 in that the existing information does not allow the impacts to be distinguished from one another. There are no differences between Issue 2, Alternatives 2A and 2B in the amount of effort and location data that each provide (only active vessels provide fishing data). Of all the alternatives under Issue 2, Alternatives 2A and 2B provide the least amount of data. However, there is more observer data available that can be used to better understand incidental catch rates by location from the limited entry portion of the fishery than is available for the other (open access, other commercial, or recreational) portions of the fishery.

Issue 3, expenditures, would apply if Issue 1, Alternatives 3 or 4 were selected. Issue 3 addresses the cost (primarily the capital costs) of a VMS program and the distribution of these costs between NMFS and the fishery participants. The differences in total fishing mortality between the alternatives under Issue 3 are expected to be negligible.

4.2.2 Ability to understand effort shifts to project impacts on groundfish, other resources, or habitat

Very little is known about fishing patterns by location or how effort will shift from closed areas to the remaining open fishing areas. Because logbook data is only available for the limited entry trawl fleet, this lack of understanding is especially true for commercial vessels that are not part of that fleet. Little specific information on fishing locations and effort is available for recreational vessels.

To better recognize the shift in fishing from areas where vessels had historically operated to those that will remain open after the depth-based conservation areas are implemented, the bycatch analysis prepared in 2002 (March 7, 2002, 67 FR 10490) was amended. Limited entry trawl logbook data was used to amend the analysis. Knowing how the fishery geographically shifts as a result of the creation of depth-based conservation areas is important to understanding how other fishery resources and habitat may be affected. (discussion of bycatch and discard analysis in section 3.3)

Love et al, 2002 divides rockfish communities into five depth related categories that are similar to those used to establish depth-based management areas: 1) intertidal, 2) nearshore (Subtidal- 16 fm), 3) shallow shelf (16-55fm), 4) deep shelf (55-109 fm), and 5) slope (109+ fm). Table 4.2.2.1 shows juvenile and adult rockfish that are generally found in each of these communities (section 3.2 of this EA also discusses, by species, habitat where adult and juvenile groundfish species are typically found). Because fish

communities can be somewhat mobile, these categories represent typical communities over a relatively broad depth and geographic area. For some species, the north-south distribution varies in that they are found in shallower depths in the northern part of their ranges as compared to the southern portions of their ranges. After parturition (when larva are released), all rockfish have a pelagic phase which usually consists of the larval and early juvenile stages. The duration of the pelagic phase varies by species as does the location occupied within the water column. With increasing size, many pelagic juveniles move deeper in the water column and closer to shore(Love et al. 2002). Eventually juvenile rockfish settle and become more closely associated with the benthic environment. Juvenile rockfish that have settled tend to be found in shallower water than adults and often occupy different communities. As juvenile rockfish mature, most tend to move to deeper habitats that are occupied by adults.

Table 4.2.2.1 Typical Rockfish Communities (Love et al. 2002)

Region	Rockfish Communities			
	Nearshore (Subtidal- 16 fm)	**Shallow Shelf** (16-55fm)	**Deep Shelf** (55-109 fm)	**Slope** (109+ fm)
Southern California Bight -Northern Baja California	**Adults** Black and Yellow Blue Brown Calico Gopher Grass Kelp Treefish **Juvenile** [1] Bocaccio Copper Striped tail Vermilion	**Adults** Blue Brown Calico Canary Chilipepper Copper Freckled Greenspotted Halfbanded Honeycomb Olive Pygmy Rosy Speckled Squarespot Starry Stripedtail Vermillion Whitespeckled **Juvenile** Bocaccio Cowcod Greenblotched Greenstriped Splitnose Stripetail Widow	**Adults** Bank Bocaccio Canary Cameleon Chilipepper Cowcod Flag Halfbanded Greenblotched Greenspotted Greenstriped Mexican Pink Pinkrose Pygmy Semaphore Shortbelly Splitnose Speckled Stripedtail Swordspine Vermillion Whitespeckled Widow Yellowtail [2]	**Adults** Aurora Bank Blackgill Bocaccio Bronzespotted Chameleon Chilipepper Cowcod Greenblotched Greenstriped Pink Pinkrose Shortbelly Spitnose Longspine Thornyhead Shortspine Thornyhead
Central California -Northern California [3]	**Adults** Black Black and Yellow Blue Brown China Copper Gopher Grass Kelp Vermillion **Juvenile** Bocaccio Canary Chilipepper Shortbelly Speckled Widow Yellowtail	**Adults** Black Blue Bocaccio Brown Canary Chilipepper China Copper Halfbanded Olive Pygmy Quillback Rosy Speckled Squarespot Starry Vermillion Yelloweye **Juvenile** Cowcod Greenspotted Greenstriped Stripedtail Widow	**Adults** Bank Bocaccio Canary Chilipepper Cowcod Flag Halfbanded Greenblotched Greenspotted Greenstriped Pygmy Redbanded Rosethorn Sharpshin Shortbelly Splitnose Stripedtail Vermillion Whitespeckled Widow Yellowtail Yelloweye **Juvenile** Splitnose	**Adults** Aurora Bank Blackgill Bocaccio Chilipepper Cowcod Darkblotched Greenblotched Greenstriped Pacific Ocean Perch Rosethorn Sharpshin Shortbelly Spitnose Longspine Thornyhead Shortspine Thornyhead
Oregon - Brithish Coulmbia [4]	**Adults** Black Blue China Copper Quillback Yellowtail **Juvenile** Bocaccio	**Adults** Black Blue Bocaccio Canary China Copper Greenstriped Pygmy Quillback Redstriped Rosethorn Silvergrey Tiger Widow Yelloweye **Juvenile** Stripedtail	**Adults** Bocaccio Canary Darkblotched Redstriped Harlequin Pacific Ocean Perch Puget Sound Pygmy Redbanded Redstriped Rosethorn Rougheye Sharpshin Shortbelly Silvergrey Splitnose Stripedtail Tiger Widow Yellowtail Yelloweye **Juvenile** Splitnose	**Adults** Aurora Bocaccio Darkblotched Greenstriped Harlequin Pacific Ocean Perch Redbanded Redstriped Rosethorn Rougheye Sharpshin Shortbelly Shortraker Silvergray Plitnose Tiger Yelloweye Yellowmouth Longspine Thornyhead Shortspine Thornyhead

[1] Particularly around northern Channel Islands and in the Santa Barbara Channel.

[2] Yellowtail rockfish are only abundant around San Miguel and Santa Rosa Islands of the northern Channel Islands.

[3] Flag, greenblotched, greenspotted, kelp, speckled, starry, and rose rockfish become less abundant or absent in northern California. POP are uncommon south and chilipepper are relatively rare north of Cape Mendocino. Redbanded, sharpshin and yelloweye are abundant i the norther part of this region.

[4] Blue and shortbelly are common at least as far north as Oregon. Bocaccio are sporadically abundant as far north as British Columbia. POP, redstriped, rougheye, silvergray, tiger, and yellowmouth are increaslingly common from Oregon northward. Harliquin and shortraker are common only as far south as British Columbia

Depth associations for other groundfish species including: the flatfishes (arrowtooth and starry flounder; butter, curlfin, Dover, English, flathead, petrale, rex, rock and sand sole; and Pacific sanddab), roundfishes (Cabezon, Kelp greenling, lingcod, Pacific cod, Pacific whiting, and sablefish), sharks and skates, and other species (finescale codling, Pacific rattail, and ratfish) are identified in section 3.2 and are shown in Table 4.2.2.2. These species are widely distributed both geographically and in depth distribution. Distribution within the water column also varies considerably between these species. As with juvenile rockfish, lingcod, sablefish, Dover sole, English sole, petrale sole, tend to occupy shallower waters as juveniles then move into deeper water habitats as they mature.

TABLE 4.2.2.2 Latitudinal and Depth Distributions of Adult Non-rockfish Groundfish Species (PFMC 2002)

Common Name	Scientific Name	Geographic Distribution	Depth Distribution	
			Range	Highest Density
Flatfish				
Arrowtooth flounder	*Atheresthes stomias*	N. 34˚ N.lat.	10-400	27-270
Buttersole	*Isopsetta isolepis*	N. 34˚ N.lat.	0-200	0-100
Curlfin sole	*Pleuronichthys decurrens*	Coastwide	4-291	4-50
Dover sole	*Microstomus pacificus*	Coastwide	10-500	110-270
English sole	*Parophrys vetulus*	Coastwide	0-300	40-200
Flathead sole	*Hippoglossoides elassodon*	N. 38˚ N.lat.	3-300	100-200
Pacific sanddab	*Citharichthys sordidus*	Coastwide	0-300	0-82
Petrale sole	*Eopsetta jordani*	Coastwide	10-250	160-250
Rex sole	*Glyptocephalus zachirus*	Coastwide	10-350	27-250
Rock sole	*Lepidopsetta bilineata*	Coastwide	0-200	summer 10-44 Winter 70-150
Sand sole	*Psettichthys melanostictus*	Coastwide	0-100	0-44
Starry flounder	*Platichthys stellatus*	Coastwide	0-150	0-82
Roundfish				
Cabezon	*Scorpaenichthys marmoratus*	Coastwide	0-42	0-27
Kelp greenling	*Hexagrammos decagrammus*	Coastwide	0-25	0-10
Lingcod	*Ophiodon elongatus*	Coastwide	0-233	0-40
Pacific cod	*Gadus macrocephalus*	North of 34°N lat.	7-30020-500	27-160
Pacific whiting	*Merluccius productus*	Coastwide	27->1,000	27-270
Sablefish	*Anoplopoma fimbria*	Coastwide		110-550
Shark and Skate				
Big skate	*Raja binoculata*	Coastwide	2-110	27-110
California skate	*Raja inornata*	Coastwide	0-367	0-10
Leopard shark	*Triakis semifasciata*	South of 46°N lat.	0-50	0-2
Longnose skate	*Raja rhina*	Coastwide	30-410	30-340
Soupfin shark	*Galeorhinus zyopterus*	Coastwide	0-225	0-225
Spiny dogfish	*Squalus acanthias*	Coastwide	0->640	0-190
Other Species				
Finescale codling	*Antimora microlepis*	Coastwide	190-1,588	190-470
Pacific rattail	*Coryphaenoides acrolepis*	Coastwide	85-1,350	500-1,350
Ratfish	*Hydrolagus colliei*	Coastwide	0-499	55-82

Data Source: Casillas et al. 1998, Eschmeyer et al. 1983, Hart 1973, Miller and Lea 1972, and NMFS survey data.

The depth-based conservation areas being adopted for 2003 have restricted particular gears from fishing on large portions of the continental shelf. This was expected to result in effort shifts to open areas that are shoreward and seaward of the conservation areas. Smaller vessels are generally not able to withstand rough seas as well as larger vessels. Because much of the groundfish fleet is comprised of small vessels, most of the effort shift is expected to be into waters that are shoreward of the conservation areas. Knowing the amount of fishing effort that shifts into shallower depths is critical to understanding the direct effects on the adult and juveniles of the various groundfish species from the 2003 management measures and the creation of conservation areas. The amount of information available for managers to understand where fishing effort is taking place and to evaluate possible impacts on the adult and juvenile groundfish species varies between the alternatives under Issue 1, the monitoring system.

Under Issue 1, Alternative 1, the status quo alternative, information on fishing effort by location would continue to be based on unverified limited entry trawl logbook data and limited observer data. Availability of logbook and observer data for management purposes is often delayed by months. The response time for management to address unintended impacts resulting from effort shifts would be lengthiest under this alternative. Declaration reports (Issue 1, Alternative 2), only provide information on the total number of vessels registered to limited entry permits and vessels using trawl gear (including open access and tribal vessels) that are intending to legally fish within a conservation area and are not in themselves beneficial to understanding effort shifts and distribution of effort outside the conservation areas. As with Issue 1, Alternative 1, information on fishing location and effort would continue to be based on unverified limited trawl logbook data and limited observer data under Issue 1, Alternative 2. The response time for management to address unintended impacts resulting from effort shifts would be similar to Issue 1, Alternative 1.

The VMS systems under both Issue 1, Alternative 3 and Alternative 4 would provide accurate harvest location data that could be used to estimate the distribution of fishing effort throughout the WOC. Because the VMS would transmit vessel positions 365 days a year, 24 hours per day, effort data from limited entry permitted vessels fishing in non-groundfish fisheries in the WOC would also be available. When this information is combined with data collected by at-sea observers, the impacts of the effort shift on adult and juvenile population could be better understood. The response time for management to address unintended impacts resulting from effort shifts would be quicker than either Issue 1, Alternative 1 or 2. However, ability to understand the extent of the impacts resulting from effort shifts on groundfish and other resources, would depend on the amount, availability and applicability of at-sea observer data for the different gears and sectors of the fishery.

Issue 1, Alternative 5, observers, could be used to verify harvest location as well as to collect catch composition and biological data from the catches. The observer information could be used to evaluate the total catch of juvenile fish and to estimate total catch by species. Because the information collected under Alternative 5 includes catch (retained and discarded) composition, it would be most beneficial in understanding the extent of the impacts of effort shifts on the resources in the long term. Data collected under Alternative 5 would not be available in realtime as would data collected under Alternatives 3 and 4.

For the limited entry trawl fleet operating north of Cape Mendocino (40°10' N. lat), bottom trawl gear has been limited to inside of 100 fm or outside 250 fm during January-June and September-December. During the summer months (July-August), the open areas for fishing have been limited to inside of 75 fm or outside 250 fm. Commercial fishing is prohibited in State waters off Washington and commercial fishing with trawl gear is prohibited in state waters off California. However, trawling is allowed in the nearshore areas off the State of Oregon. Canary rockfish has a low OY to allow for rebuilding. Because canary rockfish is vulnerable to trawl gear in the deeper shelf waters, it would be beneficial for projecting fishing impacts on the canary rockfish resource if the geographical distribution of limited entry trawl fishing effort where better understood. Other minor rockfish species found shoreward of the trawl conservation areas north of Cape Mendocino may benefit from having limited entry trawl effort data available, these species include: black, blue, china, copper, greenstriped, pygmy, quillback, redstriped, rosethorn, silvergrey, splitnose, stripedtail, and tiger. Having a better understanding of limited entry trawl effort seaward of the conservation area could be beneficial in projecting fishing impacts on thornyhead rockfishes. In addition,

understanding fishing effort distribution could be beneficial in projecting fishing impacts on cabezon, lingcod, petrale, Dover sole, and sablefish (seaward and shoreward of the conservation area).

For the limited entry trawl fleet, south of Cape Mendocino to Point Conception (34°27' N. lat.), fishing has been limited to inside 60 fm (except Jan and Feb it is inside 50 fm) and outside of 250 fm, however, between Cape Mendocino and Point Reyes (38° N. lat.), fishing has been allowed outside 150 fm. For the limited entry trawl fleet, south of Point Conception (34°27' N. lat.), fishing has been limited to inside 100 fm and outside 150 fm. Trawl limits in the area south of Cape Mendocino has been severally restricted for minor shelf and nearshore rockfish species. Because canary, bocaccio (Monterey and Conception areas), and cowcod rockfish (Conception area) have very low OYs and because they are vulnerable to trawl gear, information that aids in understanding where limited entry trawl fishing effort is occurring would be beneficial to managers and scientist.

Other rockfish that may benefit from data on fishing effort shoreward of the conservation area include: chilipepper rockfish and several minor rockfish species (bank, black, blue, brown, calico, china, copper, flag, freckled, halfbanded, honeycomb, Mexican, olive, pink, pinkrose, pygmy, quillback, rosy, speckled, squarespot, starry, whitespeckled, and vermillion). Juvenile rockfish that may benefit from data on fishing effort shoreward of the conservation area include: copper, cowcod, greenspotted, greenstriped, splitnose, widow, vermillion, and stripedtail. Effort data for fishing seaward of the conservation area would also likely be beneficial for projecting fishing impacts on the thornyhead rockfishes. Similar to the northern area, information collected under a monitoring system would likely be beneficial to cabezon, lingcod, and sablefish (seaward and shoreward of the conservation area).

Limited entry and open access fixed gear has been open in nearshore waters off Oregon (inside 27 fm) and nearshore waters off California (inside 20 fm). Information on effort shifts into these shallow areas would likely be beneficial in understanding the fishing impacts on several minor nearshore species. North of Cape Mendocino, fixed gear has been permitted outside of 100 fm and outside 150 fm south of Cape Mendocino. Darkblotched and POP are not particularly vulnerable to fixed gear. For those deeper slope rockfish species, thornyheads and sablefish, understanding where limited entry trawl fishing effort is occurring would be beneficial for projecting fishing impacts.

Issue 2, coverage, would apply if Issue 1, Alternatives 3, 4, or 5 were selected. Coverage refers to that portion of the overall fishing fleet that would be required to have VMS or observers on board in order to participate in the fishery. Issue 2, Alternative 5, would require all limited entry, open access, and recreational charter vessels to carry an observer regardless of where they fish. This alternative would be most beneficial to understanding effort shifts and projecting impacts related to fishing effort in the long-term because it would provide the most amount of information on fishing location and effort by the largest number of participants. However, at this time there is very little data (observer or otherwise) on catch composition and discard levels from open access vessels and from recreational fishing vessels. In the short-term, using effort data obtained from a VMS system to estimate changes in effort and impacts on groundfish, has been limited until more data becomes available. Issue 2, Alternative 4, would apply to all commercial and recreational charter fishing vessels that operate within the conservation areas. This group would not include vessels that fish shoreward (nearshore areas) or seaward of the conservation areas and is therefore a slightly smaller group than Issue 2, Alternative 5. Issue 2, Alternative 3 is very similar to Issue 2, Alternative 4, existing information does not allow the impacts to be distinguished from one another. There are no differences between Issue 2, Alternatives 2A and 2B in the amount of effort and location data that each provide (only active vessels provide fishing data). Of all the alternatives under Issue 2, Alternatives 2A and 2B provide the least amount of data. However, there is more observer data available that can be used to better understand effort shifts and to project impacts related to fishing effort location from the limited entry portion of the fishery than is available for the other (open access, other commercial, or recreational) portions of the fishery.

Issue 3, expenditures, would apply if Issue 1, Alternatives 3 or 4 were selected. Issue 3 addresses the cost (primarily the capital costs) of a VMS program and the distribution of these costs between NMFS and

the fishery participants. The difference between the alternatives under issue 3 in the ability to understand effort shifts and to project impacts related to fishing effort are expected to be negligible.

4.2.3 ***Other Resources***

Nongroundfish species interactions
The action is to implement a program to monitor the integrity of closed areas that were established by the annual specification and management measures. None of the management alternatives is expected to have an adverse effect on the incidental mortality levels of CPS, dungeness crab, Pacific pink shrimp, Pacific halibut, forage fish or miscellaneous species over what has been considered in previous NEPA analyses. However, knowing where fishing is occurring (Issue 1, Alternatives 3, 4 and 5) may be positive because it will allow observer data and data from other sources to be joined to better understand the extent of potential fishing related impacts on these species. In addition, Alternative 5 may provide data on incidental and total catch of these species.

Salmonids
The action is to implement a program to monitor the integrity of closed areas that were established by the annual specification and management measures. None of the management alternatives is expected to have an adverse effect on the incidental mortality levels of listed salmon species over what has been considered in previous NEPA analyses. However, knowing where fishing is occurring (Issue 1, Alternatives 3, 4 and 5) may be positive because it will allow observer data and data from other sources to be joined to better understand the extent of potential fishing related impacts on salmonids. In addition, Alternative 5 may provide data on incidental and total catch of these species.

Marine Mammals
None of the proposed management alternatives are likely to affect the incidental mortality levels of marine mammals. The WOC groundfish fisheries are considered a Category III fisheries where the annual mortality and serious injury of a stock by the fishery is less than or equal to 1 percent of the PBR level (potential biological removal). However, knowing where fishing is occurring (Issue 1, Alternatives 3, 4 and 5) may be positive because it will allow observer data and data from other sources to be joined to better understand the extent of potential fishing related impacts on various marine mammal species. In addition, Issue 1, Alternative 5 may provide data on incidental and total catch of these species.

Seabirds
The action is to implement a program to monitor the integrity of closed areas that were established by the annual specification and management measures. None of the proposed management alternatives are likely to affect the incidental mortality levels of seabirds over what has been considered in previous NEPA analyses. However, knowing where fishing is occurring (Issue 1, Alternatives 3, 4 and 5) may be positive because it will allow observer data and data from other sources to be joined to better understand the extent of potential fishing related impacts on seabirds. In addition, Issue 1, Alternative 5 may provide data on incidental and total catch of these species.

Sea Turtles
The action is to implement a program to monitor the integrity of closed areas that were established by the annual specification and management measures. None of the proposed management alternatives are likely to affect the incidental mortality levels of sea turtles over what has been considered in previous NEPA analyses. However, knowing where fishing is occurring (Issue 1, Alternatives 3, 4 and 5) may be positive because it will allow observer data and data from other sources to be joined to better understand the extent of potential fishing related impacts on sea turtles. In addition, Issue 1, Alternative 5 may provide data on incidental and total catch of these species.

Endangered Species
Species listed under the ESA are identified in section 3.2 of this EA. Specific discussion of species listed under the ESA can be found above in the sections titled salmonids, marine mammals, sea birds and sea turtles.

4.3 Socio-economic Impacts

4.3 Socio-economic Impacts
This section of the EA looks at impacts, positive and negative, on the socio-economic environment. To the extent possible, these impacts include: changes in harvest availability to the different sectors of the fishery; changes in income and revenue; costs to participants; the effectiveness and costs of enforcing the management measures, affect on fishing and low income communities; and how the actions effect safety of human life at sea

4.3.1 Availability of information needed to maintain the integrity of conservation areas and the efficiency in using enforcement resources to maintain the integrity of conservation areas

Implementing depth-based management measures over large geographic areas, such as from the U.S./Canada border to the US/Mexico border, marks the transition to a much greater dependence upon at-sea enforcement. Maintaining the integrity of the conservation areas will be largely dependent upon the ability to enforce such management measures.

In the past, fishery management measures, such as landing limits, size limits, and species landing restrictions were largely enforced by the relatively easy and inexpensive method of dockside enforcement. Enforcing depth-based closed areas represents a more costly and difficult challenge. To effectively enforce conservation areas, enforcement must be capable of patrolling the shoreward and seaward boundaries of the conservation areas. State agency patrol planes and vessels are too small and not capable of routinely patrolling the 250 fathom line, therefore, enforcement will need to rely heavily and possibly exclusively on USCG air and surface crafts. In order to patrol the conservation areas effectively, the USCG will need to supply an airplane, a helicopter, and a large cutter.

At the present time there are 4 NMFS agents (2 additional job positions are currently vacant) covering the Pacific Coast groundfish fishery. These officers and agents are responsible for enforcing all conservation regulations in the Pacific Coast groundfish fishery (e.g. size limits, trip limits, gear restrictions, etc).. They are also responsible for monitoring all other fisheries in those areas that are regulated by NMFS. In addition, there are 65 state enforcement officers (44 [with an additional 11 job vacancies] in California, ½ Oregon, and 20 for Washington with 4 stationed on the coast) that cover the groundfish fishery as well as other state fisheries. At this time, state enforcement resources (personnel and budgets) are extremely limited.

It is expected that the USCG will be performing the majority of the at-sea enforcement of conservation areas for 2003. Their estimated costs, those projected expenses needed to operate cutters and aircrafts offshore, are not expected to vary with the alternatives. Because the USCG engages in multi-purpose missions, some of the costs of at-sea surveillance are associated with homeland defense, search and rescue, pollution response, law enforcement, and training. At any time, effort may be diverted from depth-based management patrols, should the need arise.

Historically, the USCG has spent 90 percent of their time patrolling in support of living marine resources, with 45 percent of that time based on groundfish enforcement. These patrol hours have been allocated for monitoring multiple fishery management plans, marine sanctuaries, protection of the U.S. EEZ from foreign fishing, and the enforcement of international fishery agreements. The broad geographic range covered by the Pacific Coast groundfish fishery and the large number of participants, and the numerous species covered by the FMP, present a significant challenge to enforcement and highlight the limitations of traditional monitoring alone. With respect to maintaining the integrity of conservation areas, the size of the restricted areas and the amount of legal activity within the area impair the likelihood of detection through traditional methods (Issue 1, Alternative 1). When the rate of detection is low, the likelihood of the illegal activity occurring is increased (Sutinen and Andersen 1985).

Under Issue 1, Alternative 1, the no action alternative, traditional enforcement methods would continue to be used to monitor the integrity of the conservation areas. Of the alternatives, Issue 1, Alternative 1 would

be the least efficient in using limited state and federal enforcement resources and likely the least effective in monitoring the integrity of conservation areas. Issue 1, Alternative 2, which requires declaration reports for limited entry, open access fixed gear and tribal trawl vessels, would not replace or eliminate traditional enforcement measures, but would provide information that could aid enforcement in identifying vessels that are legally operating in the conservation areas from those that are fishing illegally. Because declaration reports could be used to direct traditional enforcement methods, it would result in a slightly more efficient and effective use of enforcement resources than would be expected under Issue 1, Alternative 1.

VMS, as presented under Issue 1, Alternatives 3 and 4, and observers under Issue 1, Alternative 5, would not replace or eliminate traditional enforcement measures such as aerial surveillance, boarding at-sea via patrol boats, landing inspections and documentary investigation. Traditional enforcement measures may need to be activated in response to information received via the VMS or from observers. VMS positions can be efficient in identifying possible illegal fishing activity and can provide a basis for further investigation by one or more of the traditional enforcement measures. VMS positions in themselves can also be used as the basis for an enforcement action. Vessel positions provided by observers would likely not be received in real time and would therefore be less efficient than those received from a VMS transceiver.

Deterrent - One of the major benefits of VMS (Issue 1, Alternative 3 or 4) is its deterrent effect. This has been observed and reported on through practical experience in Australia, New Zealand and the USA . It has been demonstrated that if fishing vessel operators know that they are being monitored and that a credible enforcement action will result from illegal activity, then the likelihood of that illegal activity occurring is significantly diminished. In this context, VMS is a preventive measure rather than a cure.

To be effective as a deterrent, the VMS program must maintain its credibility in the eyes of the vessel operators and its use must be kept at the forefront of their minds if the deterrent effect is to be maintained. The credibility of the system can only be maintained if all operational issues are followed up, particularly those which affect a vessel, such as failure of the vessel to report on schedule. The presence of the VMS equipment on the vessel will be a reminder to operators of its monitoring operation. Use of the system for direct communication between vessel and monitoring agency (Issue 1, Alternative 4) further strengthens the presence of the monitoring function. Issue 1, Alternative 5, observers, could also be expected to be an effective deterrent, but less so than VMS because observer reported positions are at a greater risk of being recorded incorrectly or tampered with.

Probable Cause and Targeted Investigations: In an active sense VMS (Issue 1, Alternatives 3 or 4) will potentially show enforcement officers breaches of time/area restrictions. VMS can show officers those vessels which are following the rules as well those which are not. In doing so, it makes the activities of investigating officers much more cost effective because less time will be spent pursuing false trails and fishing operators who are following the rules. It may also be a requirement to have established “probable cause” before pursuing some types of investigations, for example, in obtaining a search warrant. VMS may be of assistance in this situation because while not being evidence of sufficient significance by itself, it could provide sufficient evidence to lead an officer to believe that an illegal act had occurred.

Issue 1, Alternative 5, observers, could also be used to identify probable cause and to target investigations, but are not enforcement agents. However, because observer data and reports are not received in real time they may be less effective than either Issue 1, Alternatives 3 or 4.

Landing and at-sea inspections - In some cases, enforcement officers will have particular vessels or particular situations for which they may wish to conduct an at-sea or landing inspection, sometimes without warning to the vessel operator. Without VMS, it is extremely difficult to determine where a vessel is located at-sea or where, and at what time it might enter port. VMS (Issue 1, Alternatives 3 or 4) provides a good and reliable means of achieving this with potential savings in time and other expense in moving officers and aircraft or patrol vessels to the correct location at the appropriate time. Issue 1, Alternative 5,

observers, would not be as effective as Alternatives 3 and 4 in directing landing and at-sea inspections because observer data and reports are not received in real time.

Increasing efficiency of surveillance patrols - Patrols by both sea and air will still be necessary for fully effective monitoring and management even with an effective VMS (Issue 1, Alternatives 3 or 4). A patrolling aircraft or vessel can spend considerable time and fuel investigating legitimate fishing vessels that will appear on their radar. Providing access to VMS data for patrol craft can minimize the effort spent confirming radar contacts of vessels fishing legitimately. Further, identifying legitimate fishing vessels to patrol craft via VMS may help them choose particular contacts for more productive investigation when several contacts are made by radar. Issue 1, Alternative 2, which requires declaration reports for limited entry, open access fixed gear and tribal trawl vessels, could be used to direct traditional enforcement methods. Issue 1, Alternative 5, observers, would not be as effective as Alternatives 3 and 4 in directing landing and at-sea inspections because observer data and reports are not received in real time.

Homeland security : Implementation of a VMS (Issue 1, Alternative 3 and 4) program clearly supports an enforcement mission and has indirect benefits to Homeland Security activities. NOAA believes that increased border security correlates directly with increased risk within our EEZ and along our coast line for illegal entry. In March 2002, the "Citizen Corps" initiative was announced, which includes the expansion of "Neighborhood Watch" to include the participation of ordinary citizens in detecting and preventing terrorism. Under "Coastal Watch", the Coast Guard requests fishers to report suspicious activities for investigation and intelligence purposes. Furthermore, critical decisions on the deployment of enforcement assets can be based on VMS surveillance reports. Satellite communication can also update essential information during a law enforcement response. VMS with two-way satellite communications capability (Issue 1, Alternative 4 -VMS upgrade), which can be used to report suspicious activities or vessels directly to NMFS Special Agents, Enforcement Officers and the U. S. Coast Guard. Investigative methodologies would be enhanced via surveillance data maintained within VMS, such as easily identifying potential witnesses to incidents, locating U.S. vessels in areas of suspicious activity for assistance and support and increased intelligence gathering capabilities. By expanding the number of U.S. fishing vessels operating with VMS, NOAA and fishers are expanding the capability to detect and prevent terrorism and other criminal activity in one of our most vulnerable areas, the U.S. Exclusive Economic Zone. VMS also supports the Coast Guard's "Coastal Watch" initiative, which was developed in response to their homeland defense activities.

4.3.2 Availability of information needed to measure the effectiveness of management measures

Data gathered from commercial and recreational fisheries are essential for assessing the effectiveness of management regulations. Logbooks, landing surveys, VMS, and observers are different fishery dependent methods used to collect data on harvest location. Interception at sea by an independent vessel can also be used to obtain harvest location data. The cost of collecting data from the fishery participants tends to be lower than collecting the data from an independent source. This is because it is a byproduct of the fishing activity. Some forms of fishery dependent data, particularly unverified logbooks and landing surveys, are more subject to bias than other methods and their collection and use in measuring the effectiveness of management measures require added care.

In the limited entry trawl fisheries, vessel operators are required to submit logbooks, which are detailed records of their fishing activities. Under Issue 1, Alternative 1, trawl fishing logbooks would continue to be used to understand fishing location in relation to time/area restrictions. For Washington, Oregon and California, there is a tri-state trawl logbook program coordinated by the Pacific States Marine Fisheries Commission. This is a non-federal logbook program. Logbooks typically provide the following data: 1) vessel identity, 2) date, time and position of activity (generally one position per haul or set as compared to a track line that can be obtained from VMS), 3) weather conditions, 4) gear used, 5) amount of activity (e.g., tow length, number of hooks), 6) targeted species, and 7) estimated catch of other species including protected species. To a limited extent, information in logbooks can be verified by comparing the data from unobserved trips with observed trips that employ a similar strategy. Logbook data is generally entered from paper forms and may not be available for assessing the effectiveness of management measures for

months. Logbook data will continue to be provided under Issue 1, Alternatives 1 and 2 and provide similar levels of information that can be used to better understand the effectiveness of management measures. Data provided under Issue 1, Alternatives 2, identifying the number of vessels and the type of activity that is occurring in the RCAs would be available sooner than logbook data, but would be less detailed.

Issue 1, Alternative 3 and 4 provide for VMS systems that have the potential of producing reliable and useful information for assessing the effectiveness of management measures. At a minimum, the data can be used to efficiently monitor fishing location and to verify times and dates reported on both logbooks and in observer data as well as assist in the interpretation of fishery data. It can also be used to provide information on days at sea and location data for sectors of the fleet (limited entry fixed gear and open access) where logbook data is not available. To a limited degree, data that identifies when fishing trips are occurring may help to determine if reporting and recordkeeping requirements are being met.

Understanding where fishing effort is occurring in realtime may provide insight into understanding information reported on fish tickets and be useful in understanding how management measures affect fishing behavior. Knowing where a vessel is fishing as compared to where the catch is being landed, may be valuable in assessing the effectiveness of trip limit management lines and differential trip limits. The data provided by VMS (Issue 1, Alternatives 3 and 4) are cost effective and accurate over large geographical areas. Accurate and timely data on fishing locations is necessary to assess effectiveness of closed areas and the overall results of the management scheme.

VMS data can be combined with observer data to assess the effectiveness of management measures. However, the value in combining observer data with VMS data for non-enforcement purposes depends on the amount of tow-by-tow observer data on catch and discards that is available from the different gears and fishing strategies. In the long term, when combined with observer data, VMS may provide information that results in a better understanding of fishery location and a spacial understanding of fish stocks. Unlike Issue 1, Alternative 5 (observers), VMS are limited in that there is not direct observation of the type of fishing gear being deployed. However, when VMS data are combined with information from declaration reports, as is proposed under Issue 1, Alternatives 3 & 4 (with VMS) and Alternative 5 (with observers), information on the gear type being used aboard the vessel when it intended to fish in a conservation area would be available.

The Northwest Fishery Science Center has developed a prototype electronic logbook for commercial fisheries off the West Coast. An electronic logbook can be considered to be similar to a conventional logbook, but with the fisher recording data in a computer rather than a paper logbook. The logbook uses personal computers combined with ship to shore communications and a secure onshore database. This system can be integrated with VMS transceivers that allow for two-way communications (Issue 1, Alternative 4). By combining the electronic logbook with the VMS system proposed under Issue 1, Alternative 4, it is possible that logbook data can be transmitted directly to NMFS from the vessel.

There are a number of benefits to electronic logbooks combined with a VMS system. First, there is only a single data entry function and this can be performed very soon after each fishing operation is completed. Paper logbooks must first be filled out by the fisher and then submitted to a government agency for data entry before logbook data can be used. In performing the data entry function, the fisher will interact directly with the editing checks for the data and a more complete and accurate data record can be required before the data record is accepted by the computer system. Having electronically recorded the data, the operator may produce a hard copy and also transmit the data to the fisheries agency or other recipients such as the fishing company, and may be easily incorporated into appropriate databases. As a result, improvements in timeliness, accuracy and reduced costs are possible. When the data is in the database and available to be analyzed, it can be used to improve the ability of managers to measure the effectiveness and economic impacts of management measures.

Observers (Issue 1, Alternative 5) are generally used to collect independent effort and catch data from commercial and recreational charter vessels. Observer data can be used to verify logbook data and provide information that makes it possible to manage by what is caught (total catch) not just what is landed

and reported. Observer data can be extremely useful in assessing the effectiveness of management measures, however, observer coverage is expensive (see section 4.3.4 for more information on observer costs). Although the data collected by observers is critical to fisheries management, much of the data collected by observers extends beyond the need that has been identified for this action.

4.3.3 The effects on harvesters (tribal and non-tribal), processors, and communities

Time/area closures have long been used to restrict fishing activity in the Pacific Coast groundfish fishery in order to keep harvests within sector allocations and at sustainable levels or to prohibit the catch of certain species. For 2003, the Council sought a management strategy that would allow fishing to continue in areas and with gear that can harvest healthy stocks with little incidental catch of low abundance species. Recent stock assessments for bocaccio, yelloweye, canary and darkblotched rockfish, indicate little surplus production is available for harvest. Measures must be taken to protect these stocks and rebuild them to sustainable biomass levels. Therefore, the Council recommended that NMFS define additional management areas for the groundfish fishery that are based on bottom depth ranges where these low abundance species are commonly found. As discussed above, for 2003, large-scale depth-related areas, referred to as rockfish conservation areas, have been used to prohibit both commercial and recreational fishing across much of the continental shelf. Deep-water fisheries on the slope and nearshore fisheries will be permitted, but only in areas seaward or shoreward of the depth-based conservation areas.

The boundaries of the groundfish conservation areas are complex, involving hundreds of points of latitude and longitude to delineate nearshore and offshore fathom curves. The areas are vast, extending along the entire West Coast from Canada to Mexico, and the weather and sea conditions are frequently harsh. Some fishing, such as midwater trawling for pelagic species and shrimp trawling with finfish excluders, will be allowed to occur in the conservation areas. In addition, vessels intending to fish seaward of the westernmost boundary of a conservation area will be allowed to transit through the area, provided the gear is properly stowed. Ensuring the integrity of conservation areas using traditional enforcement methods is especially difficult when the closed areas are large-scale and the lines defining the areas are irregular. Furthermore, when some gear types and target fishing are allowed in all or a portion of the conservation area while other fishing activities are prohibited, it is difficult and costly to effectively enforce restrictions using traditional methods. Scarce resources also limit the use of traditional enforcement methods.

To allow for a more liberal depth-based management regime, as proposed by the Council for 2003, it is necessary to take action to establish a monitoring program to ensure the integrity of these large irregularly shaped depth-based conservation areas. With the 2003 Annual Specifications and Management Measures, the Council recommended several mitigating factors associated with depth-based management strategy, including implementation of a VMS monitoring system, to track movement of vessels through and within depth zones. Without a management strategy based on depth-based conservation areas, the fishery would be managed under more seriously constrained limits on healthy stocks that co-occur with overfished species. Geographically defined areas would likely revert to those that were in place before September 2002. These areas tended to be nearshore or defined by a simple latitude lines.

A more liberal depth-based management regime, such as that proposed by the Council for 2003, is only possible if the integrity of the depth-based conservation areas can be ensured. Maintaining the integrity of the conservation areas will be largely dependent upon the ability to enforce such management measures. Without the ability to ensure the integrity of the conservation areas, it is most likely that the depth-based management strategy will be discontinued. If this were the case, the management structure would revert back to more restrictive limits or no limits on healthy stocks in order to protect overfished species. Under Issue 1, Alternative 1, the no action alternative, there would be no program developed to monitor time/area closures in the Pacific Coast groundfish fishery and only traditional enforcement methods would be used to monitor the integrity of the conservation areas. It is likely that under Issue 1, Alternative 1, status quo, the integrity of the conservation areas could not be maintained and the management structure would revert back to those that were in place before September 2002 and more restrictive limits. Issue 1,

Alternative 2 would have only a slightly better ability to maintain the integrity of closed areas than Issue 1, Alternative 1.
Issue 1, Alternatives 3 and 4, the VMS alternatives, are most likely to maintain the integrity of conservation areas and allow depth-based conservation areas to continue to be used.

If the depth-based management strategy continues, the economic benefits to fishery participants, processors, and communities would be maintained. The economic benefits of a depth-based management regime are fully discussed in the EIS prepared for the 2003 Annual Specifications and Management Measures (PFMC 2002), including the tradeoffs in harvest levels with and without the depth-based management regime. Higher limits and an increased ability to obtain the OY for healthy stocks would provide processors with fish and continue to provide employment opportunity within the communities. Issue 1, Alternative 5, observers, may also allow a fishery to sustain higher harvest levels on healthy stocks. Under Issue 1, Alternative 5, observers, could be an effective deterrent and be used to identify probable cause and to target investigations, but they are not enforcement agents. However, because observer data and reports are not received in real time they may be less effective than either Alternatives 3 or 4.

If the fishery were to revert back to those areas that were in place prior to September 2002 (conducted without depth-based conservation areas), the fishery would likely have lower limits for healthy stocks and the ability to obtain the OY of the healthy stocks would be reduced. Reductions in revenue as a result of the reduced harvest level would be expected (see section 4.3.4 for further discussion). Reductions in harvest by the imposition of trip limits would reduce gross revenue from the species to which the limit applies. If the species is a minor part of the complex that is being fished (harvest that is incidental to the main target species) and the limits for other species are not reduced, the trip limit will result in similar amounts of effort at a similar harvest cost but less revenue. If the harvest limit is for a species that comprises a significant component of the incentive for a particular fishing strategy, there may be a reduction in effort such that the reduction in net benefits is the reduction in revenue less the reduction in harvest costs. The revenue reduction is not just the revenue associated with the trip limit species but also includes the revenue that would have been earned from the harvest of all other species that would have been caught and retained as part of the target complex as well as any incidental catch that would have been retained for use.

Cumulative limits are a kind of output control that do not tell fishermen when, where, or how to take their fish. Restrictions that meet conservation objectives by dictating the manner of fishing generally impose inefficiencies that increase costs. Depth restrictions prevent fishers from harvesting healthier stocks in areas where the incidental harvest of overfished groundfish species is likely to be high. Depth restrictions may also create inefficiencies if harvest of the healthier stocks is forced to occur outside the optimal catch areas, where the CPUE is likely to be lower, resulting in higher costs. To the degree that vessels target species by moving effort into areas remaining open, it is likely that CPUE would be lower than in normal fishing areas, resulting in higher cost per unit of harvest.

In general, managing a fishery without accurate and timely data (Issue 1, Alternatives 1 and 2) poses the greatest risk to the economic stability in the fishery participants, processors and communities. The integrity of the closed areas must be maintained to reduce the risk of exceeding the OYs for overfished species. In addition, reliable information on fishing effort including location is needed to merge with catch data from observed trips to more accurately account for total fishing mortality. If total fishing mortality is higher than estimated, trip limits and harvest allocations may be set too high, and the long term health of the stocks may be jeopardized. If total fishing mortality is lower than estimated, trip limits and harvest allocations may be set too low. By adopting regulations to support an effective monitoring program (Issue 1, Alternatives 3, 4, or 5) and maintaining the integrity of closed areas, the long-term impact on communities is expected to be positive, because it would be expected to reduce the likelihood of overfishing that would likely result in further harvest reductions.

Issue 2, coverage, would apply if Issue 1, Alternatives 3, 4, or 5 were selected. As noted above, coverage refers to that portion of the overall fishing fleet that would be required to have VMS or observers on board

in order to participate in the fishery. Issue 2, Alternative 5, would require all limited entry, open access, and recreational charter vessels to carry VMS or an observer regardless of where they fish. This alternative would be most beneficial to maintaining the integrity of the conservation areas in the long-term because it would provide the most amount of information on fishing location and effort by the largest number of participants. Issue 2, Alternative 4, would apply to all commercial and recreational charter fishing vessels that operate within the conservation areas. This group would not include vessels that fish shoreward (nearshore areas) or seaward of the conservation areas and is therefore a slightly smaller group than Issue 2, Alternative 5. Issue 2, Alternative 3 is very similar to Issue 2, Alternative 4. Existing information does not allow the impacts to be distinguished from one another. There are no differences between Issue 2, Alternatives 2A and 2B in the ability to monitor the integrity of conservation areas. Of all the alternatives under Issue 2, Alternatives 2A and 2B provide the least amount of data, but cover that portion of the fleet with the greatest capacity and cover a very large portion of the overall harvests. The integrity of the closed areas is expected to be maintained under these alternatives.

4.3.4 Cost burden

Table 4.3.4.1 shows the estimated burden per vessel for the monitoring system alternatives described under Issue 1. These include the costs for installation, VMS transceiver unit, annual maintenance, replacement cost, cost to transmit hourly positions, declaration reports, and observer costs. Table 4.3.4.2 details components of shows the estimated cost to participants for preparing and submitting declaration reports. The following text also refers to Table 4.3-5b from the Final Environmental Impact Statement for the Proposed Groundfish Acceptable Biological Catch and Optimum Yield Specifications and Management Measures 2003 Pacific Coast Groundfish Fishery which has been incorporated into this document as Table 4.3.4.3.

Table 4.3.4.1. Estimated Burden, per Vessel, for the Monitoring System Alternatives Described under Issue 1

	Alternative 1 No action	Alternative 2 Declarations	Alternative 3 Basic VMS system with declaration reports	Alternative 4 Upgraded VMS system with declaration reports	Alternative 5 Observers with declaration reports
Installation - start up cost	$0	$0	* Minimal - not to exceed 4 hours or $120 * Most are do-it yourself installation * 5 min to complete installation report, $3 to send fax to NMFS	* Minimal - not to exceed 4 hours or $120, except for the Trimble Galaxy $400 * All except Trimble Galaxy are do-it yourself installation * If attached to personal computer may require dealer to install software * 5 min to complete installation report, $3 to send fax to NMFS	$0
VMS transceiver/transponder unit - start up cost	$0	$0	* $1,550-$3,800 ($800 if new units are approved by NMFS)	* $2750 ($1,550 for unit plus approx. $1,200 for computer) - $5,295	$0
Annual maintenance	$0	$0	* 4 hours or $120 per year	* 4 hours or $120 per year	$0
Annual replacement costs (unit cost/years of service - estimate based on 4 years of service)	$0	$0	* $200-$950 per year	* $675-$1,324 per year	$0
Annual cost to transmit 24 hourly position reports	$0	$0	* $1.67-$5/day	* $1-$3.5/day	$0
Annual cost to transmit exemption reports (4 min/rpt)	$0	$0	$0	$0	$0
Annual cost to transmit declaration report (4 min/rpt- 12 time per year)	$0	$0	$0	$0	$0
Observer costs to the vessels - if a direct pay system similar to the at-sea Pacific whiting fishery is used, for each day the observer is on the vessel the cost to the vessels would be $300/day. Training and debriefing costs would be an additional $1200/observer. NOTE: The costs of sampling equipment or infrastructure needed to support an increased number of observers and their data has not been included in this estimate. Including these costs is estimated to increase the daily rate by approximately 30%.	$0	$0	$0	$0	$18,000 year @ 5 fishing days per mo ($1,500) $36,000 year @ 10 fishing days per mo ($3,000) $72,000 @ 20 fishing days per mo ($6,000) $108,000 @ 30 fishing days per mo ($9,000) * Food for observer as much as $30/day

Declaration reports (Issue 1, Alternatives 2-5)
To assist enforcement in identifying vessels that are legally fishing in conservation areas, vessels registered to limited entry permits with trawl endorsements; any vessel using trawl gear, including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber; and any tribal vessel using trawl gear, would be required to send a declaration report before the vessel is used to fish in any trawl RCA or the CCA in a manner that is consistent with the requirements of the conservation areas (e.g. pelagic trawl during when permitted for yellowtail and widow rockfish or Pacific whiting or pink shrimp gear with a finfish excluder during the pink shrimp season). In addition, declaration reports would be required from vessels registered to limited entry permits with longline and pot endorsements, before the vessel can be used to fish in any Non-trawl RCA or the CCA, in a manner that is consistent with the requirements of those conservation areas. Vessels such as salmon troll and sport charter vessels are look different unique from other types of fishing vessels such that they can easily be identified from an airplane and would therefore not be required to provide declaration reports.

Each declaration report would be valid until cancelled or revised by the vessel operator. After a declaration report has been sent, the vessel cannot engage in any activity with gear that is inconsistent with that which can be used in the conservation area unless another declaration report is sent to cancel or change the previous declaration. Declaration reports would be sent to NMFS and vessel operators would receive confirmation that could be used to verify that the reporting requirement was met. It is necessary for a vessel owner, operator or representative to submit these reports because only they can make statements about where they intend to fish.

Improved technology would be used to reduce the reporting burden on NMFS and the fishery participants. Vessels will call in declaration reports by using an Interactive Voice Response (IVR) system . The IVR system, which is accessed by dialing a toll-free number, asks the caller to use the touch-tone telephone to respond to a series of questions. An IVR system allows vessels to quickly and easily submit their report 24 hours a day and will reduce the paperwork burden on both the fisherman and the NMFS, as it makes it easier to collate the information submitted in the reports and monitor fishing activity.

Aside from the cost in time to summarize and call in an IVR report, there will be no additional cost burden for respondents. All respondents are assumed to have access to a telephone. The telephone call will be placed through a toll-free number so the respondent will not pay for the call. Table 4.3.4.2 shows the estimated burden to the fishery participants with the coverage level described under Issue 2, Alternative 2A. Issue 2, Alternative 2B, 3, 4 and 5 would be slightly lower in cost since there would be 38 fewer respondents.

Table 4.3.4.2 Estimated burden to the fishery participants for declaration reports

Maximum total number of VMS respondents (424 limited entry + 294 exempted trawl + 5 tribal trawl)	723
Est. number of declaration reports per year (12 per respondent x 723 respondents)	8,676
Est. hours per response to prepare and submit declaration reports (4 minutes per response)	0.0667
Total hours for all respondents to prepare and submit declaration reports per year	578
Total hours per respondent per year to prepare and submit declaration reports (48 minutes)	0.8
Total cost per respondent per year to prepare and submit declaration reports (@$30 per hour)	$24

VMS (Issue 1, Alternatives 3 and 4)

Installation - The time burden for the actual installation of the units proposed under Alternatives 3 and 4 are estimated at 4 hours per vessel, or $120. Personnel costs are estimated to be $30 per hour. The actual installation time for a VMS unit is estimated to be less than two hours, but a higher estimate of 4 hours/vessel is used, based on a worst case scenario where the power source (such as a 12 volt DC

outlet) is not convenient to a location where the VMS unit can be installed. Most of the systems being considered for type-approval under Issue 1, Alternatives 3 and 4 are do-it-yourself installations.

The ArgoNet MAR GE uses a single mobile transmitting unit mounted atop the vessel. The unit contains an Argos transceiver, an integrated global positioning system (GPS) receiver, a battery, and an antenna. The mobile transceiver unit is connected to a power junction box in the wheelhouse, which can be installed in less than 1 hour. The Qualcomm/Boatracs unit (Alternative 4), which is currently used in the Northeast scallop, Northeast multispecies, and Atlantic herring fisheries requires a dealer to install, but the cost of installation is included in the price of the transponder unit. The installation of the Inmarsat-C Thrane units are do-it-yourself while the Trimble units must be installed by Trimble-trained and Trimble-authorized support dealers. This is expected to result in an installation charge of $400. The installation of software and attachment of a personal computer to an Inmarsat-C unit (Alternative 4) may also require dealer assistance.

Installation/Activation Report - Given that the VMS hardware and satellite communications services are provided by third parties as approved by NMFS, there is a need for NMFS to collect information regarding the individual vessel's installation in order to ensure that automated position reports will be received. This information collection would not increase the time burden for installation of VMS, but would require that a certification and checklist be returned to NMFS prior to using the VMS transceiver to meet regulatory requirements. An installation checklist would be issued by NMFS and the VMS installer would certify the information about the installation by signing the checklist and returning it to NMFS.

The checklist indicates the procedures to be followed by the installers and, upon certification and return to NMFS, provides the Office of Law Enforcement with information about the hardware installed and the communication service provider that will be used by the vessel operator. Specific information that links a permitted vessel with a certain transmitting unit and communications service is necessary to ensure that automatic position reports will be received properly by NMFS. In the event that there are problems, NMFS will have ready access to a database that links owner information with installation information. NMFS can then apply troubleshooting techniques to contact the vessel operator and discern whether the problem is associated with the transmitting hardware or the service provider.

The time and cost burden of preparing and submitting installation information to NMFS is minor. Submission of a checklist would be required only for the initial installation or when the hardware or communications service provider changes. NMFS estimates a time burden of 5 minutes ($2.50 at $30 per hour) for completing the checklist and additional $3 for mailing/faxing to NMFS, for a total of $5.50 per occurrence. If all 424 vessels registered to limited entry permits were required to have VMS transceivers, there would be a time burden of 34 hours ($1,020 at $30 per hour) for all vessels to prepare the activation/installation report, and a cost of $1,272 to transmit the report to NMFS. For the estimated 386 vessels that actively fish in the WOC, there would be a time burden of 31 hours ($930) for all vessels to prepare the reports, and a cost of $1,158 to transmit the report to NMFS.

The ability for NMFS to ensure proper operation of the VMS unit prior to the vessel's departure will save time and money. The installation checklist and activation report will be made available over the internet. These reports would be faxed or mailed to NMFS.

VMS transceiver unit On September 23, 1993, NMFS published proposed VMS standards at 58 FR 49285. On March 31, 1994, NMFS published final VMS standards at 59 FR 15180. These notices stated that NMFS endorses the use of VMS and defined specifications and criteria for VMS use. On September 8, 1998, NOAA published a request for information (RFI) in the Commerce Business Daily in which it stated the minimum VMS specifications necessary for NOAA's approval. The information was used as the basis for approving the mobile transceiver units and communications service providers.

VMS Systems currently in use in other federally managed fisheries include: ArgosNet MAR YX, ArgosNet MAR GE, Analog Cell (AMPS) with Trimble crosscheck, Boatracs Omnitracs, and Inmarsat-C. Table 4.3.4.4. which was compiled by the OLE National VMS Steering committee, compares the primary

features of the VMS equipment approved for use in various Federal fisheries. The two commonly-used systems are Inmarsat and Argos. Because these systems are widely used, they are more stable in the marketplace than lesser used systems (i.e. service providers and units are more likely to exist into the future compared with smaller start-up companies).

Currently, there are no VMS transceiver units specifically type-approved for the Pacific Coast groundfish fishery. However, NMFS is in the process of testing units and expects to have a list of approved units available in late 2003. As units are tested and approved, a list of VMS mobile transponder units and communications service providers approved by NOAA for the Pacific Coast groundfish fishery will be prepared and published in the *Federal Register*. Each time the list is revised, it will be published in the *Federal Register*.

The North American Collection and Location by Satellite, Inc. (NACLS) is the sole service provider of the ArgoNet systems. The Argos Mar-GE and MAR-YX mobile transponder units costs $1,800 -$2,000 . The ArgoNet MAR GE uses NOAA polar-orbiting satellites, and, as such, it is considered a NOAA Data Collection and Location System. The use of any NOAA Data Collection and Location System is governed by 15 CFR part 911. Under these regulations, the use of a NOAA Data Collection and Location System can be authorized only if it is determined that there are no commercial services available that are adequate. In addition, special provisions have been made because of cost effectiveness to the Government, resulting in a temporary approval (3 year approval was granted for the Atlantic pelagic longline fishery). This unit meets the requirements of Issue 1, Alternative 3, but does not meet the requirements of Issue 1, Alternative 4 because the ArgoNet communications are one way only. Optional reports can be transmitted with the purchase of a handheld keypad ($400-$550). The unit contains a protected push button to request assistance from United States search and rescue authorities, however, search and rescue authorities still could not use the MAR GE transceiver to communicate with the vessel because it only accommodates one-way communications.

As of June 10, 2002, 50 CFR 679.7(a)(18), has required all vessels fishing in the Bering sea and Gulf of Alaska using pot, hook-and-line or trawl gear that are permitted to directly fish for Pacific cod, Atka mackerel or pollock to have an operable VMS transceiver. Approximately 49 vessels that had limited entry permits or participated in the WOC open access fishery in 2001 qualify for reimbursements to the Argos MAR-GE as a result of their participation in the Alaska groundfish fishery. This issue is further addressed in section 4.3.5 below. Allowing the use of Argos MAR-GE by WOC operating vessels that have purchased these units for participation in the Alaska groundfish fisheries would eliminate the cost of purchasing, installing and maintaining a second unit for these vessels. Similarly, allowing vessels to use units they have already purchased for other business purposes, providing they are a type-approved model with the required software and hardware, would also eliminate the cost of purchasing, installing and maintaining a second unit for these vessels. The number of vessels that currently have VMS transceivers is unknown.

The Boatracs/Omnitracs transponder unit costs about $5,300, including installation. Because the Boatracs/Omnitracs allows for continuous two-way communications 24 hours a day, it exceeds the requirements of Issue 1 Alternative 3 and meets the requirements of Issue 1, Alternative 4. For vessels in the Northeast Atlantic fisheries, Boatracs had offered a lease-to-own option with a 24 month or 36 month lease.

Inmarsat C transponders range from $1,550 to $3,800, not including a personal computer which would be approximately $1,200 more. Inmarsat-C units are simple and small enough to be hand-carried or fitted to almost any vessel. When fitted with a personal computer, two-way communications via the Inmarsat-C system are data or message-based, and meet the requirements of Issue 1, Alternative 4. Without the personal computers, these units meet the requirements of Issue 1, Alternative 3. Data can be coded into data bits and can be transmitted via Inmarsat-C. Most maritime Inmarsat-C terminals are equipped with a distress-alerting feature which, in the event of an emergency, automatically generates and sends a priority distress message, incorporating position and other information, to a rescue coordination center.

The Analog Cell (AMPS) with a Trimble Crosscheck transponder is approximately $800. Trimble Crosscheck systems use GPS and radio links to monitor vessels. These units have been widely used to track trucking fleets and automobiles in the continental US.

New units that have not yet been type-approved for any federal fisheries include the Inmarsat D+ with a transponder that costs about $800 and a waveburst/TMI which sells for about $2,300.

Most of the VMS transceiver units can be operated for extended periods from the same DC power source used to run other on board electronic equipment and so should increase power consumption only marginally.

Maintenance of transponder unit Vessel operators are required to operate the VMS unit continuously throughout the a year. This means that the vessel operator will maintain the transponder unit, antennas and the electrical sources that power the system.

When an operator is aware that transmission of automatic position reports has been interrupted, or when notified by NMFS that automatic position reports are not being received, they must contact NMFS and follow the instructions provided. Such instructions may include, but are not limited to, manually communicating to a location designated by NMFS the vessel's position or returning to port until the VMS is operable. There is a reporting burden associated with this requirement, but it is not expected to be substantial. The annual burden of these communications and the time required to maintain the antennas and electrical systems on the vessel operator is estimated to be approximately 4 hours per year or $120. In addition, some systems may require software to be updated. Many of the transponders can have their set of features upgraded by being reloaded/flashed with updated versions.

If a unit needs repair there may be fishing opportunity lost unless the unit can be quickly replaced or if there is access to rental units.

Replacement cost The various VMS transceivers have similar life spans of about 5 years before the units need to be replaced. Because of advancements in VMS systems or service providers that may no longer provide services, some models may become obsolete in less than 5 years. The purchase of these units may be considered as a tax deductible business expense during the first year of use. For depreciation purposes, VMS devices using satellite technology may qualify as “five-year property”, although devices using cell phone technology probably will be treated similar to other cell phone equipment, as “seven-year property.” For the purposes of this analysis, 4 years was used to estimate unit replacement costs identified in Table 4.3.4.1.

Cost to transmit hourly positions The primary costs after purchase and installation of a VMS is the charge for the messages that communicate the vessel's position. Once installed and activated, position reports are transmitted automatically to NMFS via satellite. Vessel operators are required to operate the VMS unit continuously throughout the year. The total costs for these messages depend on the system chosen for operation and the number of fishing days for units with a sleep function. Many of the systems have a sleep function. Position transmissions are automatically reduced when the vessel is in port. This allows for port stays without significant power drain or power shutdown. When the unit restarts, normal position transmissions automatically resume before the vessel goes to sea.

The estimated time per response varies with type of equipment and requirement. Upon installation, vessel monitoring or transponder systems automatically transmit data, which takes about 5 seconds. Under Issue 2, alternative 2A , there are estimated to be 424 vessels that will be required to have VMS and to continuously transmit position reports except, when issued a VMS exemption or when the vessel is inactive in port and the VMS goes into sleep mode.

Boatracs, Inc. charges a rate of $3.50/ day for one message each hour of every day, this would be $105 dollars per month or $1,260 annually if operating all 365 days in a year. Because vessels will not have to transmit position reports when moored in port (or otherwise inactive for extended periods), the number of

messages will be reduced by the sleep mode function. With Boatracs, if a vessel averages 10 fishing days per month the monthly cost would be $35 and the annual cost would be $420. Inmarsat would cost $10 per month or $120 per year, and Argos GE $50 per month or $600 per year. Assuming 386 vessels being required to be equipped with a VMS (Issue 2 Alternative 2 B), and each operating 10 days per month, the total annual message costs of transmitting position reports would be about $162,120 with Boatracs, $ 46,320 with Inmarsat and $231,600 with Argos MAR-GE. Actual message costs will vary depending on how frequently a vessel fishes. At the extreme, if all 424 vessels were to fish 365 days per year, with 24 hourly reports per day, 3,714,240 position reports would be required, each taking about 5 seconds for a total transmission time of 5,159 hours annually. With transmission cost varying between $1 and $5 per day, the cost to the individual vessel would be $365-$1,825 per year, or a total of $154,760 - $773,800 for all respondents.

Exemption reports

Exemption Reports would be sent by the vessel owner or operator whenever they wanted their vessel to be excused from the requirement to operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year (e.g. when the vessel will be operating outside of the EEZ for more than 7 consecutive days or the vessel will be continuously out of the water for more than 7 consecutive days). A vessel may be exempted from the requirement to operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year if a valid exemption report, is received by NMFS OLE and the vessel is in compliance with all conditions and requirements of the exemption. An exemption report would be valid until a second report was sent canceling the exemption.

Improved technology would be used to reduce the reporting burden on NMFS and the fishery participants. Vessels will call in exemption reports by using an Interactive Voice Response (IVR) system . The IVR system, which is accessed by dialing a toll-free number, asks the caller to use the touch-tone telephone to respond to a series of questions. An IVR system allows vessels to quickly and easily submit their report 24 hours a day and will reduce the paperwork burden on both the fisherman and NMFS, as it makes it easier to collate the information submitted in the reports and to monitor fishing activity.

Aside from the cost in time to summarize and call in an IVR report, there will be no additional cost burden for respondents. All respondents are assumed to have access to a telephone. The telephone call will be placed through a toll-free number so the respondent will not pay for the call. Two exemption reports are estimated to be submitted per vessel annually under Issue 1, Alternatives 3 and 4, each report would require approximately 4 minutes to submit, for an average cost of $4 per vessel per year (at $30 per hour).

Burden on Fishery Participants

Table 4.3.4.3 (PFMC 2002) shows estimated vessel revenues under different 2003 management options, that were considered in the annual specifications and management process for the 2003 groundfish fishery. The alternative actions included the Councils preferred alternative and an alternative most similar to the preferred alternative, but without depth-based management. The alternative without depth-based management will be referred to as the allocation committee status quo depth management alternative. Estimated revenues under these two scenarios were used to assess the impact to the fishery of managing with and without depth-based measures under the fishing constraints adopted for the 2003 commercial season. For purposes of this analysis, the difference in exvessel revenue under the two scenarios can be thought of as a measure of the fishing opportunity gained by adopting a depth-based management regime, including the VMS requirement, compared with managing to comparable OY levels but without depth-based features.

Table 4.3.4.3 breaks in average exvessel revenue for different vessel classes. The vessels in this table that would be most directly affected by the VMS requirement are the limited entry trawl, longline and pot vessels, and the exempted trawl vessels from the two open access classes. From the table we see that 247 limited entry trawl vessels were estimated to earn an average of $180,000 exvessel revenue under the Council's preferred alternative, as compared with the average $154,000 under the allocation committee status quo depth management alternative, a difference of $26,000 per vessel. Similarly, we

see that the 197 limited entry longline and pot vessels were estimated to earn an average $96,000 in exvessel revenue under the Council's preferred alternative, compared with an average of $82,000 under the allocation committee status quo depth management alternative, a difference of $14,000 per vessel. The difference in average revenues for the two classes of open access groundfish vessels is less, but still significant: $7,000 for the 516 vessels with less than 5% of revenue from groundfish, and $3,000 for the 771 vessels with more than 5% of revenue from groundfish.

While exvessel revenues appear higher on average for vessels likely to be required to use VMS under the depth-based management regime, it should be noted that non-VMS fishing costs may also be higher, offsetting some of the apparent gain. Unfortunately vessel cost data necessary to estimate this effect are not currently available. It is also important to keep in mind that using average revenues masks the variability of ex-vessel revenues in each vessel class. While on average, additional revenues appear greater than VMS-related costs, for some individual vessels in each class this will not be the case.

Table 4.0.1 shows that the average per vessel costs of adopting VMS under Monitoring System Alternative 3 range from $2,163 to $5,623 in the first year, and from $548 to $1,698 each subsequent year. Similarly under Monitoring System Alternative 4, VMS-related costs range from $3,878 to $7,607 in the first year, and from $1,063 to $2,342 each subsequent year. Comparing these per vessel average cost estimates with the average revenue gains derived above indicates that on average, and depending on how other non-VMS costs are affected, most vessels could potentially be better off with depth-based management, including VMS related costs, than under the likely alternative management regime that did not include depth-based management. The obvious exception would be Open Access vessels with more than 5% of revenue from groundfish. Under most of the alternatives, the first year VMS-related costs would apparently outweigh the expected average benefit for these vessels (although once VMS is installed, in subsequent years, the annual operating, maintenance and replacement costs would generally be less than average additional revenues).

TABLE 4.3.4.3. Projected average exvessel revenue per vessel from all species by vessel length class from all sources recorded on West Coast fish landing receipts and vessels delivering to motherships.

Length Class	Number of Vessels	Alternative: Baseline (11/00-10/01)	Low OY	High OY	Alloc Com (Status Quo Depth Mgmt)	Alloc Com with Depth Management	Preferred Option	Preferred Option (no caps)
		Average Exvessel Revenue Per Vessel ($ thousands, all species)						
Limited Entry Trawl								
<40'	5	75	59	68	57	66	67	67
40'-50'	31	111	92	107	90	105	105	105
50'-60'	64	161	135	166	120	154	156	156
60'-70'	57	245	183	222	179	204	207	207
70'-150'	84	278	192	245	199	220	222	222
Unspecified	6	96	62	86	71	71	71	71
Total	247	211	157	195	154	178	180	180
Limited Entry Longline and Fishpot								
<40'	85	56	44	58	41	49	53	54
40'-50'	71	97	72	98	79	83	90	90
50'-60'	25	173	139	171	139	146	158	158
60'-70'	11	290	239	295	243	247	270	270
70'-150'	4	280	236	285	242	243	263	263
Unspecified	1	5	3	6	3	3	4	4
Total	197	103	81	104	82	88	96	96
Open Access with > 5% of Revenue from Groundfish								
<40'	675	15	7	12	10	11	11	13
40'-50'	66	37	24	38	27	33	34	35
50'-60'	12	16	11	15	12	13	14	14
60'-70'	6	39	25	39	29	37	38	38
70'-150'	2	3	3	3	3	3	3	3
Unspecified	10	10	6	9	2	8	8	9
Total	771	17	9	15	11	13	14	15
Open Access with < 5% of Revenue from Groundfish								
<40'	324	38	32	38	32	38	38	38
40'-50'	109	57	50	57	51	57	57	57
50'-60'	29	120	113	120	112	120	120	120
60'-70'	28	191	177	191	178	190	191	191
70'-150'	25	209	198	209	197	208	208	208
Unspecified	1	3	3	3	3	3	3	3
Total	516	63	56	63	56	63	63	63
Nongroundfish Vessels								
<40'	1967	19	19	19	19	19	19	19
40'-50'	432	52	44	52	52	52	52	52
50'-60'	254	104	60	104	103	104	104	104
60'-70'	80	156	92	156	154	156	156	156
70'-150'	101	259	152	259	259	259	259	259
Unspecified	14	37	37	37	37	37	37	37
Total	2848	44	33	44	44	44	44	44

Table 4.3.4.4. VMS Equipment Currently in Use In Federally managed Fisheries (Compiled by the OLE National VMS Steering committee- 8/27/2002)

Communication Service	Argos	Analog Cell (AMPS)	Argos	Qualcomm / Boatracs	Inmarsat-C
Transceiver/transponder name	**MAR YX**	**Trimble Crosscheck**	**MAR GE**	**Boatracs Omnitracs**	**Trimble Galaxy TNL 7001 and 7005, Thrane and Thrane TT3022D**
Fisheries in use/Number of boats	Demonstration application on American Samoa Alia (Longline) vessels/2	Demonstration applications to date: Gulf of Mexico Shrimp and Trap, and Sea of Cortez Shrimp (Mexico)	AK Atka/8, AK Cod and Pollock/500, Atlantic Pelagic Longline (HMS), Pacific-West Coast Groundfish Demonstration/2	NE Scallop/284, NE Multispecies/42, Atlantic Herring/26	Hawaii Pelagic Longline/130, Hawaii Lobster/10, Foreign Settlement (Penalty)/25, Antarctic Krill/1, Atlantic Pelagic Longline (HMS) /4
Geographic coverage, when in line of sight of satellite or cell	Global	Various cellular coverage	Global	Contiguous US EEZ	Global to 78°N/S
Communication between ship – shore	One-way, (ship-to-shore)	Two-way	One-way, (ship-to-shore)	Two-way	Two-way
Satellite type	Polar-orbiting, 4 NOAA meteorological	N/a	Polar-orbiting, 5 NOAA meteorological	Geo-Stationary, Qualcomm	Geo-Stationary, INMARSAT
Time between the vessel position fix and receipt at NMFS	Varies per latitude, Alaska – 10-30min. avg. wait. HMS – 60-90min. wait	Near real time, if within cell coverage	Varies per latitude, Alaska – 10-30min. avg. wait. HMS – 60-90min. wait	Near real time	Within 5-10 minutes
Ability to poll/query the transceiver	No	Yes	No	Yes	Yes
Interval between position reports	30 - 60 minutes depending upon latitudes	Various programming: 5 minutes to length of trip, or upon event (e.g. entering area)	30 - 60 minutes depending upon latitudes	Configurable	Configurable for 5 minutes to 24 hours
Ability to change the interval between position reports	Factory reprogramming	Manually set on the unit by OLE	Factory reprogramming	Remotely from service provider	Remotely from OLE
Position calculation (accuracy)	Integrated GPS (20m), reverts to Doppler when GPS blocked (350 or 1000m)	Integrated GPS (20m)	Integrated GPS (20m), reverts to Doppler when GPS blocked (350 or 1000m)	Qualcomm triangulation (300m)	Integrated GPS (20m)
Automatic anti-tampering and unit status messages	Yes	Yes	Yes	No	Yes
Distress signal	Yes	Yes?	Yes	Yes	Yes
Reduces power when stationary	Yes	No	Yes	No	Yes
Installation	Do-it-yourself	Do-it-yourself	Do-it-yourself	Dealer (costs included)	Dealer or electrician (costs not included), or do-it-yourself
Internal battery back-up	Primary power is internal battery	No	Yes, 48-hour	No	No
Log or memory buffer storing positions / number of positions	No/?	Yes/3000	Yes, must download manually/?	No	Yes, auto, remote or manual download/ Trimble – 5000 Thrane – 100
Can send logbook/catch report data	Limited status messages	?	Yes, with computer	Yes	Yes, with computer
Transceiver/transponder cost	$1800	$800	$2000 ($400 keypad optional)	$5300, including terminal	Thrane TT3022D $2650, TT3026M $1,550; Trimble $3800, optional computer for email not included
Daily communications cost for hourly positions	$5	$2	$5	$3.5	$1

Observer Costs (Issue 1, Alternative 5) - Under Issue 1, Alternatives 5, it is assumed that a direct pay system, similar to that used in the at-sea whiting fishery would be used to implement observer coverage. The costs of observers, would consist of 5 components: 1) paying observer's salaries (while training and on the vessel) 2) providing food and living accommodations, 3) providing adequate sample space and time for sampling, 4) carrying liability insurance, and 5) meeting safety requirements. The total costs to the individual vessel and to the fleet (and the number of vessels affected) would vary depending on the coverage alternative that was chosen under Issue 2.

The costs to the vessel to obtain a third party observer in the whiting fishery was approximately $300 per day at sea in 2002. In addition, vessels were responsible for paying training and debriefing costs that occurred before and after the observer's deployment. This would have been approximately $1,250 per observer. Vessels would also be responsible for providing the observer's living accommodations and food equivalent to that which is provided to the crew, under alternatives 5. The costs for an observer would vary between vessels and depend on the number of days fished. At 5 fishing days per month ($1,500/month) a vessel would pay $18,000 per year for an observer not including training and debriefing costs; at 10 fishing days per month ($3,000/month) a vessel would pay $36,000 per year for an observer not including training and debriefing costs; at 20 fishing days per month ($6,000/month) a vessel would pay $72,000 per year for an observer not including training and debriefing costs; and at 30 fishing days per month ($9,000/month) a vessel would pay $108,000 per year for an observer not including training and debriefing costs. In addition, each vessel would need to provide food for an observer which expected to increase costs to the vessel by as much as $30/observer day. The cost to the fleet to carrying observers to monitor fishing location in relationship to depth-based conservation areas depends on the coverage option that selected under Issue 2 and the number of vessels that would be required to carry an observer.

Information is not available to estimate indirect costs such as those associated with a possible reduction in crew size if crew members are displaced because of limited bunk space. Vessels may also incur costs if they choose to carry additional liability insurance. These costs would vary between individual vessels depending on the insurance carriers minimum allowed coverage period, and the coverage approach that is taken. Adequate information to estimate the costs to the vessel was not available for this analysis. It is also expected that additional time would be required in port for vessels to arrange for observer coverage.

Among the vessels in the open access and limited entry groundfish fisheries that could be selected to carry an observer, there are substantial differences in terms of annual ex-vessel value of their groundfish and WOC catch, the number of days fished per year, and the size of living and work space. It is likely that the smallest groundfish vessels would be most affected by the requirements under Issue 1, Alternative 5. Without minimal sample space, safe conditions, and adequate time to collect samples data quality cannot be assured. It may be determined that some vessels are simply too small to accommodate an observer and may need to be exempt from the requirement. Similarly, vessels with the least revenue may be excessively burdened if required to carry an observer over an extended period of time.

4.3.5 Vessels That Qualify for VMS Reimbursements in the Alaska Groundfish Fishery

On January 8, 2002, an emergency interim rule (67 FR 956) was issued by NMFS to implement Steller sea lion protection measures and 2002 harvest specifications for the groundfish fisheries in federal waters off Alaska. All vessels using pot, hook-and-line or trawl gear in the directed fisheries for pollock, Pacific cod or Atka mackerel are required to have an endorsement on their federal fisheries permit. As of June 10, 2002, Section 679.7(a)(18) requires all vessels using pot, hook-and-line or trawl gear that are permitted to directly fish for Pacific cod, Atka mackerel or pollock to have an operable VMS transceiver. Table 4.3.5.1 shows the number of vessels that landed groundfish in the WOC during 2001 and that are also qualified for VMS reimbursement in the Alaska groundfish fisheries.

For these fisheries, NMFS approved the ArgoNet MarGE transceiver, for which North American Collection and Location by Satellite, Inc. (NACLS) is the sole communications service provider. The Argos system was approved because of its ability to meet other specified VMS elements which could not be met by the

other systems. Because the ArgoNet MAR GE uses NOAA polar-orbiting satellites, and, as such, it is considered a NOAA Data Collection and Location System (DCS). The use of any NOAA DCS is governed by 15 CFR part 911. Pursuant to those regulations, use of a NOAA DCS can be authorized only if it is determined that there are no commercial space-based services available that meet the user's requirements.

The list price of ARGOS MAR-GE units is $2,000 plus freight and installation. The cost per day is $5 for 24 hourly positions. After approximately 11.5 hours of inactivity, the unit goes into sleep mode, incurring only $5/week transmission costs until activity (movement) resumes. There is currently a reimbursement program for the initial VMS equipment purchase. The Pacific States Marine Fisheries Commission has received a grant of over $1.5 million for reimbursements to vessel owners who are required to purchase VMS units for Alaska groundfish fishery participation. Eligible participants receive reimbursements for up to $2,000 of the purchase price of the VMS unit.

Table 4.3.5.1 Vessels that landed groundfish in the WOC during 2001 that are also qualified for VMS for reimbursement Alaska groundfish fisheries

	Number of vessels
Number of WOC groundfish vessels that qualify for reimbursement for Argos Mar-GE VMS because of participation in the pollock, cod or Atka mackerel fisheries off Alaska	49
Number of vessels that have already purchase Argos Mar-GE VMS units	32
The number of vessels that have already been reimbursed	17

4.3.5 Safety of Human Life at Sea-- Search and Rescue Efficiency

There is a certain degree of danger associated with groundfish fishing, however, little is known about the connection between fisheries management measures and incident, injury, or fatality rates in the fishery. Moreover, little is known about risk aversion among fishers or the values placed on increases or decreases in different risks. Decreased harvest may lead to less investment in fishing vessels safety and less care by skippers. If this were to occur, the rate of safety related incidents, injury, or fatality rates could increase. However, if the number of harvesters decreases, and the time at sea decreases, the rates of safety related incidents, injury, or fatality could decrease.

The USCG has safety concerns with encouraging fishing outside 250 fathoms especially during the winter months. If fishing is poor in open shelf and nearshore areas, trawlers north of 40°10' N. Lat. may be required to transit approximately 40 miles offshore to reach open fishing grounds. These extended transits will result in longer exposure to harsh weather conditions, especially during winter months. This problem is compounded by the relatively small size (less than 60 feet) and slow speed of most of these fishing vessels. Small vessels are not able to withstand rough seas as well as larger vessels. In order for these small vessels to fish at depths greater than 250 fathoms, they will need to add cable to set their gear at deeper depths. Additional cable will result in gear and deck modifications that add weight topside, above the vessel's center of gravity. The relatively slow speed of the trawl fleet will make it difficult for them to run from weather or return to port before sea conditions become hazardous.

Should the USCG need to assist a fishing vessel in distress, search and rescue missions are more dangerous during winter months. It usually takes USCG surface vessels longer to respond during harsh weather and if the weather is really bad, fishing vessels cannot afford to wait for assistance very long.

Therefore, length and speed of the limited entry trawl fleet, gear and deck modifications necessary to fish at depths greater than 250 fathoms, in combination with weather and sea conditions, may reduce the safety margins available to fishers, observers, and enforcement officials during fall and winter months. VMS may provide information that can reduce the time needed for the USCG to arrive at the vessel's location.

Much like enforcement costs, safety is expected to vary with the alternatives. It is expected that the safety will be inversely proportional to the length of time vessels attempt to access deepwater species. However, without better information, it is difficult to determine with a high degree of accuracy, the effect of a given alternative on safety to human life. Issue 1, Alternatives 3 and 4 will have the greatest safety benefits because the VMS system will provide for a distress signal that may reduce response time in an emergency. However, VMS cannot be used at this time as replacements for EPIRBS, but can be of assistance during an emergency. Some systems have distress buttons and allow for two-way communications. All the systems can show where a vessel is located. However, they become ineffective should power be lost or a vessel sink. EPIRBS have their own power source and are designed to release from the vessel should it go down. Issue 1, Alternative 4 has the greatest benefit because 2-way communication can increase communications regarding vessel safety and medical issues. Benefits under Issue 1, Alternative 1, 2 and 5 will vary considerably between vessels due to fishing locations, equipment available on vessels, and how well equipment is maintained. As noted above, when fishing opportunity is reduced and profits are marginal, vessels may display more risk prone behavior and may not adequately maintain equipment and vessels.

4.4 Cumulative Impacts

Cumulative effects must be considered when evaluating the alternatives to the issues considered in the EA. Cumulative impacts are those combined effects on quality of human environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what federal or non-federal agency undertake such actions (40 CFR 1508.7, 1508.25 (a), and 1508.25 (c))

The area that would be affected by actions in this documents is the Pacific Coast Groundfish Fishery in the state and federal waters (0 to 200 miles off shore) seaward of the baseline from which the territorial sea is measured off the West Coast states. The proposed issues and alternative actions are summarized in Table 2.0.1. above. Potential direct and indirect effects of the alternative actions presented under each issue are summarized above in Table 4.0.1. Table 4.4.1 sets out the expected effects of the preferred alternatives.

Table 4.4.1 Expected Effects of NMFS preferred alternatives if affects accumulate over time	
Issue/Alternative	**Expected effects**
Issue 1, Alternative 3 : Basic VMS System Establishes standards for VMS transceiver and mobile communication service providers that are consistent with the VMS standards published on March 31, 1994 at 59 FR 15180, the specifications published by OLE in the Commerce Business Daily on September 8, 1998 . Requires operators of any vessel registered to a limited entry permit and any trawl vessel, including those using open access exempted trawl gear and tribal vessels, to provide notice regarding the intent to fish in a conservation area. This declaration notice requirement would affect approximately 386 limited entry vessels, 248 open access vessels and 5 tribal vessels. Provides for a basic VMS system that would transmit vessel positions, via secured satellite communications, to a central data processing center managed by the NMFS Office of Enforcement (OLE).	• Because VMS provides accurate harvest location data over a large geographical area and can be used to improve the general understanding of depth ranges in which fisheries occur; identify how fishing effort is distributed by depth; and help maintain the integrity of restricted areas. Data is especially needed for the fixed-gear fisheries in which effort data is not available from logbooks. If the integrity of depth-based conservation areas cannot be maintained, then such a management strategy would be discontinued. The depth-based management strategy allows higher harvest levels on healthy stocks and provides greater fishing opportunity for harvesters and fish for processors than would otherwise be allowed • Harvest location data can be joined with data from observed trips to better estimate fishing mortality; to assess effectiveness of bycatch management actions and depth-based management adopted as part of the 2003 management measures; develop management measures for the 2004 fishery; and assess the total mortality on overfished species as is required in proposed rebuilding plans. • The VMS and declaration systems will aid enforcement in identifying vessels legally fishing in conservation areas. This is expected to deter illegal fishing in restricted areas. VMS may be used to target landings and at-sea inspections; increase efficiency of surveillance patrols; and as a basis for enforcement action. Being able to easily identify vessels that are engaged in fishing may also benefit homeland security activities. • VMS promotes safety of human life by providing a distress signal that may reduce response time in an emergency.

Table 4.4.1 Expected Effects of NMFS preferred alternatives if affects accumulate over time, continued	
Issue 2, Alternative 2A: All vessels registered to a limited entry permit. Beginning in 2003, require all trawl and fixed gear vessels registered to limited entry permits to have VMS as specified under issue 1. Vessels would be required to have VMS transceiver units on board at all times regardless of the fishery. ***NOTE TO THE READER*:** The Council coverage recommendation was for all vessels registered to a limited entry permit and that fish in state and federal waters off Washington, Oregon, and California. This variation falls between alternatives 2A and 2B and the information is not available to determine exactly how many vessels will be affected. Alternative 2A was used for the purpose of the EA.	• Approximately 424 vessels, including catcher/ processors (257 trawl, 140 line, 11 pot , and 16 combined gears) that fish in state and federal waters off Washington, Oregon, and California would be required to continuously operate VMS transceiver units. If a limited entry trawl vessel buy back were to occur in the near future the number of vessels would likely be reduced. • Enforcement would be able to use its resources to effectively monitor limited entry vessels for unlawful incursions into conservation areas while allowing legal incursions, such as midwater trawling, for Pacific whiting, yellowtail and widow rockfish and non-groundfish target fisheries to occur. The complexity of the 2003 groundfish regulations and recent cuts in state enforcement budgets has placed a heavy burden on the enforcement resources. Using the existing resources efficiently is expected to result in the increased ability to detect illegal activity and to pursue the appropriate action. This would be expected to result in an increased rate of compliance by fishers. Future groundfish regulation will likely remain similar to the current regulations. • A notable number of limited entry vessels also participate in non-groundfish fisheries that would continue to occur in the conservation area. These non-groundfish fisheries which incidentally take groundfish, include shrimp and prawn trawl fisheries, troll albacore and troll salmon fisheries, and the pot fisheries for crab. Because vessels would be required to have an operable VMS unit on board whenever the vessel is fishing in state and federal waters position data could also be collected to supplement management data forsome non-groundfish fisheries. This data could be valuable to rebuilding measures, because many of these fisheries also interact with overfished species. • That portion of the fleet with the greatest fishing capacity would be covered. This would allow the integrity of the restricted areas to be maintained. More observer data is available from the limited entry fleet than the open access fleet. Observer data can be used to better understand effort shifts and to project impacts related to fishing effort.

Issue 3, Alternative 1: Vessel pays all. The vessel owner/operator would be responsible for paying all costs associated with purchasing, installing and maintaining the VMS transceiver unit, as well as the costs associated with the transmission of reports and data from the vessel. This alternative would not preclude reimbursement for all or a portion of expenditures at a later point in time, if money were available.	• The average per vessel costs of adopting VMS under Monitoring System Issue \$2,163 to \$5,623 in the first year, and from \$548 to \$1,698 each subsequent ye the fleet, the benefits to harvesters and processors from maintaining a depth-ba outweighs the cost of providing for VMS. Given groundfish harvest reductions i indicated that they are operating without profit and further harvest reductions wo If a depth-based management strategy cannot be maintained more fishers will l than is currently occurring.

The impacts of these past, proposed and foreseeable future actions

2003 specifications and management measures: Of the past, proposed and foreseeable future actions that are also expected to affect these same waters and fishers, the most notable action was the Pacific Coast groundfish fishery specifications and management measures for 2003. For 2003, large-scale depth-based restrictions for fishing across much of the continental shelf were adopted and are intended to further the conservation goals and objectives of the FMP by allowing fishing to continue in areas and with gears that can harvest healthy stocks with little incidental catch of low abundance species. The effects of the 2003 groundfish specifications and management measures have been described and analyzed in a final Environmental Impact Statement (EIS) prepared by the staff of the Pacific Fishery Management Council. The EIS contains discussion on several mitigating factors that emerged during the development of the depth-based management regime adopted for 2003 fishery. With the implementation of a VMS system, used to track movement of vessels through and within depth zones, being one such factor. This proposed action creates a VMS program that will promote compliance with regulations that were put in place to support management of the fishery as defined for 2003.

2004 specifications and management measures: The use of time area closures and depth-based management are expected to continue in 2004 and beyond. Therefore the VMS monitoring program that is established by this action will be available as a tool to support future management strategies based on time area management.

Amendment 13 to the groundfish FMP : Among other things Amendment 13 recognized the value of VMS in enforcing closed areas that are established to reduce bycatch levels. Amendment 13 also identified VMS as a technological tool that could be used to improve bycatch management by providing fishing location data that can be used in conjunction with observer data collections.

Amendment 16 to the groundfish FMP: Will specify the required contents of rebuilding plans and defines species specific rebuilding plans. The proposed action will support rebuilding measures overtime by improving the ability to manage harvest levels established for rebuilding. By adopting regulations to support an effective monitoring program and maintaining the integrity of closed areas, the long-term impact on overfished stocks is expected to be positive, because it would be expected to reduce the likelihood of overfishing that would likely result in further harvest reductions.

An observer program for catcher vessels in the Pacific Coast groundfish fleet (50 CFR 660 Subpart G. -65 FR 20609, April 24, 2001). VMS data can be combined with observer data to assess the effectiveness of management measures. However, the value in combining observer data with VMS data for non-enforcement purposes depends on the amount of tow-by-tow observer data on catch and discards that is available from the different gears and fishing strategies. In the long term, when combined with observer data, VMS may provide information that results in a better understanding of fishery location and a spacial understanding of fish stocks. Unlike Issue 1, Alternative 5 (observers), VMS are limited in that there is not direct observation of the type of fishing gear being deployed. However, when VMS data are combined with information from declaration reports, as is proposed under Issue 1, Alternatives 3 & 4 (with VMS) and Alternative 5 (with observers), information on the gear type being used aboard the vessel when it intended to fish in a conservation area would be available..

An Observer Program for At-sea Processing Vessels in the Pacific Coast Groundfish Fishery The costs of carrying an observer during whiting will be in addition to the cost of VMS and is about $300 per day. On average in 2001, each vessel fished for 31 days (ranging from 9-118 days). At $300 per day, the average cost to the vessel for each observer was $9,300 (ranging from $3,950 -$36,650) during the 2001 whiting season. In addition, training and debriefing costs would have been approximately $1,250 per observer.

5.0 CONSISTENCY WITH THE FMP AND OTHER APPLICABLE LAWS

5.1 Consistency with the FMP

The socio-economic framework in the Pacific Coast Groundfish FMP requires that proposed management measures and viable alternatives be reviewed and consideration given to the following criteria: a) how the action is expected to promote achievement of the goals and objectives of the FMP; b) likely impacts on other management measures; c) biological impacts; d) and economic impacts, particularly on the cost to the fishing industry; and e) accomplishment of one of a list of factors.

GOALS AND OBJECTIVES OF THE FMP

The Council is committed to developing long-range plans for managing the Pacific Coast groundfish fisheries that prevent overfishing and loss of habitat, yet provide the maximum net value of the resource, and achieve maximum biological yield. Alternatives 2 and 3 are consistent with FMP goal 1-objective 1, and goal 3-objective 10.

> Goal 1- Conservation: Objective 1 -- maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.
>
> Goal 3- Utilization: Objective 10 -- strive to reduce the economic incentives and regulatory measures that lead to wastage of fish. Also, develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. In addition, promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

ACCOMPLISHMENT OF ONE OF THE FACTORS LISTED IN FMP SECTION 6.2.3.

Under the socio-economic framework, the proposed action must accomplish at least 1 of the criteria defined in section 6.2.3 of the FMP. Alternatives 3, 4 and 5 are likely to accomplish objective 2 by providing information to avoid exceeding a quota, harvest guideline or allocation, and objective 13 by maintaining a data collection and means for verification.

5.2 Magnuson-Stevens Conservation and Management Act

The Magnuson-Stevens Act provides parameters and guidance for federal fisheries management, requiring that the Councils and NMFS adhere to a broad array of policy ideals. Overarching principles for fisheries management are found in the Act's National Standards. In crafting fisheries management regimes, the Councils and NMFS must balance their recommendations to meet these different national standards.

National Standard 1 requires that conservation and management measures shall prevent overfishing while achieving on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The proposed action is to implement a monitoring program to monitor the integrity of closed areas that were established to protect overfished species. Information provided under Issue 1, Alternatives 3, 4 or 5 have the least risk of overfishing because they would provide information that could be used to reduce the likelihood of overfishing while allowing for the harvests of healthy stocks

National Standard 2 requires the use of the best available scientific information. The proposed action is to implement a monitoring program to monitor the integrity of closed areas that were established to protect overfished species. Data collected under Issue 1, Alternative 5 would provide timely catch and biological data from the at-sea fishery. Data collected under Issue 1, Alternatives 3 or 4 would be used to understand the level of fishing effort and how it was distributed. When combined with data from the existing federal observer program it could be used to more accurately estimate total catch.

National Standard 3 requires, to the extent practicable, that an individual stock of fish be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination. This standard is not affected by the proposed action to implement a monitoring program to monitor the integrity of closed areas.

National Standard 4 requires that conservation and management measures not discriminate between residents of different States. None of the alternatives would discriminate between residents of different States.

National Standard 5 is not affected by the proposed actions because it does not affect efficiency in the utilization of fishery resources.

National Standard 6 requires that Conservation and management measures take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches." All alternatives meet this standard

National Standard 7 requires that conservation and management measures to minimize costs and avoid unnecessary duplication. Several measures were taken to minimize the costs of a monitoring program to the industry. The council recommended that the basic VMS (Issue 1, Alternative 3) unit be implemented rather than an upgraded and more expensive model that allows for two-way communications (Issue 1, Alternative 4). Alternatives 2-5 require declaration reports for vessels that intended to legally fish within a conservation area. To reduce the time burden and cost of declaration reports, they would only be required when vessel changes gears rather than on every trip.

National Standard 8 provides protection to fishing communities by requiring that conservation and management measures be consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities. The proposed alternatives are consistent with this standard.

National Standard 9 requires that conservation and management measures to minimize bycatch and minimize the mortality of bycatch. NMFS is required to "promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality. The proposed action to implement a monitoring program to monitor the integrity of closed areas that were established to protect overfished species is consistent with this standard.

National Standard 10 Conservation and Management measures shall, to the extent practicable, promote the safety of human life at sea. Issue 1, Alternatives 3 and 4 will have the greatest safety benefits because the VMS system will provide for a Distress signal that may reduce response time in an emergency. Under Issue 1, Alternatives 5, observers would be NMFS-certified and would therefore be considered observers under the Magnuson-Stevens Act and the vessels would be required to meet observer heath and safety provisions at 50 CFR 600.725 and 600.746.

Essential Fish Habitat This action will affect fishing in areas designated as essential fish habitat (EFH) by Amendment 11 to the FMP. The proposed action is to implement a monitor program to monitor the integrity of closed areas that were established to protect overfished species. The potential effects of the proposed actions are not expected to have either no adverse effect on EFH, or to have a positive effect resulting from reduced fishing effort in critical areas. No EFH consultation is warranted for this action.

5.3 Endangered Species Act

NMFS issued Biological Opinions (B.O.) under the ESA on August 10, 1990, November 26, 1991, August 28, 1992, September 27, 1993, May 14, 1996, and December 15, 1999 pertaining to the effects of the groundfish fishery on chinook salmon (Puget Sound, Snake River spring/summer, Snake River fall, upper Columbia River spring, lower Columbia River, upper Willamette River, Sacramento River winter, Central Valley spring, California coastal), coho salmon (Central California coastal, southern Oregon/northern California coastal), chum salmon (Hood Canal summer, Columbia River), sockeye salmon (Snake River, Ozette Lake), and steelhead (upper, middle and lower Columbia River, Snake River Basin, upper Willamette River, central California coast, California Central Valley, south-central California, northern California, southern California). During the 2000 Pacific whiting season, the whiting fisheries exceeded the 11,000 fish chinook bycatch amount specified in the Pacific whiting fishery B.O. (December 19, 1999) incidental take statement, by approximately 500 fish. In the 2001 whiting season, however, the whiting fishery's chinook bycatch was about 7,000 fish, which approximates the long-term average. After reviewing data from, and management of, the 2000 and 2001 whiting fisheries (including industry bycatch minimization measures), the status of the affected listed chinook, environmental baseline information, and the incidental take statement from the 1999 whiting B.O., NMFS determined that a re-initiation of the 1999 whiting BO was not required. NMFS has concluded that implementation of the FMP for the Pacific Coast groundfish fishery is not expected to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat. This proposed rule implements a data collection program and is within the scope of these consultations. Because the impacts of this action fall within the scope of the impacts considered in these B.O.s, additional consultations on these species are not required for this action.

5.4 Marine Mammal Protection Act

Under the MMPA, marine mammals whose abundance falls below the optimum sustainable population level (usually regarded as 60% of carrying capacity or maximum population size) can be listed as "depleted". Populations listed as threatened or endangered under the ESA are automatically depleted under the terms of the MMPA. Currently the Stellar sea lion population in the WOC is listed as threatened under the ESA and the fur seal population is listed as depleted under the MMPA. Incidental takes of these species in the Pacific Coast fisheries are well under the annual PBR. None of the proposed management alternatives are likely to affect the incidental mortality levels of species protected under the MMPA.

The WOC groundfish fisheries are considered category III fisheries where the annual mortality and serious injury of a stock by the fishery is less than or equal to 1 percent of the PBR level. Implementation of Alternatives 3,4, or 5 are expected to benefit MMPA species because it will allow observer data and data from other sources to be joined to better understand the extent of potential fishing related impacts on various marine mammal species.

5.5 Coastal Zone Management Act

The proposed alternatives would be implemented in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved coastal zone management programs of Washington, Oregon, and California. This determination has been submitted to the responsible state agencies for review under section 307(c)(1) of the Coastal Zone Management Act (CZMA) . The

relationship of the groundfish FMP with the CZMA is discussed in Section 11.7.3 of the groundfish FMP. The groundfish FMP has been found to be consistent with the Washington, Oregon, and California coastal zone management programs. The recommended action is consistent and within the scope of the actions contemplated under the framework FMP.

Under the CZMA, each state develops its own coastal zone management program which is then submitted for federal approval. This has resulted in programs which vary widely from one state to the next. The EA for Amendment 14 to groundfish FMP contains a summary of the fishery relevant consistency criteria used in federal consistency determinations by each state.

5.6 Paperwork Reduction Act

This action contains a collection-of-information subject to the PRA. These materials all represent a new collection of information that are subject to the Paperwork Reduction Act (PRA).

Declaration reports Under Issue 1, Alternatives 2,3, 4 and 5 vessels registered to limited entry permits; any vessel using trawl gear, including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber; and any tribal vessel using trawl gear, will be required to submit a declaration report to NMFS before the vessel is used to fish in any rockfish conservation area, including the cowcod closure. This report would allow NMFS to identify vessels that were legally fishing within a restricted conservation areas. Declaration reports will include: the vessel name and/or identification number, and gear declaration. At 4 minutes per response for each declaration report the expected time burden on the public from all 723 respondents would be 578 hours annually.

Installation/activation reports Under Issue 1, Alternatives 3 and 4, vessel owners and operators would be required to follow a prescribed installation protocol and provide certain information about the installation of their VMS transceiver unit to NMFS. An installation checklist would be issued by NMFS and the VMS installer would certify the information about the installation by signing a certification form and returning it to NMFS. At 4 hours per response for installation of the VMS transceiver unit and 5 minutes per response to send the installation/activation report the expected time burden on the public from all 424 respondents would be1,696 hours for installation of the VMS transceiver units and 34 hours annually for sending the installation/activation report .

Hourly position reports Under Issue 1, Alternatives 3 and 4, hourly positions are automatically transmitted to NMFS via satellite once the VMS transceiver unit is installed and activated. Vessels that are required to have VMS must operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year, except when the vessel leaves state and federal waters off the west cost for an extended period. The number of annual transmissions depends on the VMS transceiver that the vessel owner purchases and the number of fishing days per year in the managed area. With many of the systems, there is a sleep function, when the vessel is in port, position transmissions are automatically reduced. At 5 seconds per response for each hourly transmission the expected time burden on the public from all 424 respondents would be 5,159 hours annually.

Exemption reports Under Issue 1, Alternatives 3 and 4, an exemption report could be sent by the vessel owner or operator because they wanted their vessel to be excused from the requirement to operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year. Such exemptions would only be allowed for vessels that operate seaward of the EEZ for more than 7 consecutive days or for vessels that are continuously out of the water for more than 7 consecutive days. A vessel may be exempted from the requirement to operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year if a valid exemption report, is received by NMFS, Office for Law Enforcement (OLE) and the vessel is in compliance with all conditions and requirements of the exemption. At 4 minutes

per response for each exemption report the expected time burden on the public from 145 respondents would be 19 hours annually.

5.7 Executive Order 12866

This action is not significant under E.O. 12866. This action will not have a cumulative effect on the economy of $100 million or more nor will it result in a major increase in costs to consumers, industries, government agencies, or geographical regions. No significant adverse impacts are anticipated on competition, employment, investments, productivity, innovation, or competitiveness of U.S.-based enterprises.

5.8 Executive Order 13175

Executive Order 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

The Secretary of Commerce recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. At Section 302(b)(5), the Magnuson-Stevens Act reserves a seat on the Council for a representative of an Indian tribe with Federally recognized fishing rights from California, Oregon, Washington, or Idaho.

The U.S. government formally recognizes that the four Washington Coastal Tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes' usual and accustomed (U and A) fishing areas (described at 50 CFR 660.324). Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives. The proposed regulations have been developed in consultation with the affected tribe(s) and, insofar as possible, with tribal consensus.

5.9 Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act of 1918 was designed to end the commercial trade of migratory birds and their feathers that, by the early years of the 20th century, had diminished populations of many native bird species. The Act states that it is unlawful to take, kill, or possess migratory birds and their parts (including eggs, nests, and feathers) and is a shared agreement between the United States, Canada, Japan, Mexico, and Russia to protect a common migratory bird resource. The Migratory Bird Treaty Act prohibits the directed take of seabirds, but the incidental take of seabirds does occur. None of the proposed management alternatives, or the Council recommended action are likely to affect the incidental take of seabirds protected by the Migratory Bird Treaty Act.

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) is intended to ensure that each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations develop and implement a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service that shall promote the conservation of migratory bird populations. Currently, NMFS is planning to develop and implement a MOU with the U.S. Fish and Wildlife Service. None of the proposed management alternatives are likely to have a measurable effect on migratory bird populations.

5.10 Executive Order 12898 (Environmental Justice) and 13132 (Federalism)

There is no specific guidance on application of EO 12898 to fishery management actions. The EO states that environmental justice should be part of an agency's mission "by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations."

These recommendations would not have federalism implications subject to E.O. 13132. State representatives on the Council have been fully consulted in the development of this policy recommendation.

6.0 REGULATORY IMPACT REVIEW AND REGULATORY FLEXIBILITY ANALYSIS

The RIR and IRFA analyses have many aspects in common with each other and with EAs. Much of the information required for the RIR and IRFA analysis has been provided above in the EA.. Table 6.0.1 identifies where previous discussions relevant to the EA and IRFA can be found in this document. In addition to the information provided in the EA, above, a basic economic profile of the fishery is provided annually in the Council's SAFE document.

Table 6.0 1 Regulatory Impact Review and Regulatory Flexibility Analysis

RIR Elements of Analysis	Corresponding Sections in EA	IRFA Elements of Analysis	Corresponding Sections in EA
Description of management objectives	1.2 and 1.3	Description of why actions are being considered	1.2 and 1.3
Description of the Fishery	3.3	Statement of the objectives of, and legal basis for actions	1.0
Statement of the Problem	1.2 and 1.3	Description of projected reporting, recordkeeping and other compliance requirements of the proposed action	4.3
Description of each selected alternative	2.2	Identification of all relevant Federal rules	5.0
An economic analysis of the expected effects of each selected alternative relative to status quo	4.3		

6.1 Regulatory Impact Review

The RIR is designed to determine whether the proposed action could be considered a "significant regulatory actions" according to E.O. 12866. E.O. 12866 test requirements used to assess whether or not an action would be a "significant regulatory action", and identifies the expected outcomes of the proposed management alternatives. 1) Have a annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities;2) Create a serious inconsistency or otherwise interfere with action taken or planned by another agency; 3) Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or 4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive Order. Based on results of the economic analysis contained in section 4.3, this action is not expected to be significant under E.O. 12866.

Requirements of an IRFA

The Regulatory Flexibility Act (5 U.S.C. 603) states that:
(b) Each initial regulatory flexibility analysis required under this section shall contain--

(1) a description of the reasons why action by the agency is being considered:
(2) a succinct statement of the objectives of, and legal basis for, the proposed rule;
(3) a description of and, where feasible, and estimate of the number of small entities to which the proposed rule will apply;
(4) a description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
(5) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule.

(c) Each initial regulatory flexibility analysis shall also contain a description of any significant alternatives to the prosed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as--

(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
(2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
(3) the use of performance rather than design standards; and
(4) an exemption from coverage of the rule, or any part thereof, for such small entities.

6.2 Initial Regulatory Flexibility Analysis

When an agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an Initial Regulatory Flexibility Analysis (IRFA) that describes the impact on small businesses, non-profit enterprises, local governments, and other small entities. The IRFA is to aid the agency in considering all reasonable regulatory alternatives that would minimize the economic impact on affected small entities (attachment 1). To ensure a broad consideration of impacts on small entities, NMFS has prepared this IRFA without first making the threshold determination whether this proposed action could be certified as not having a significant economic impact on a substantial number of small entities. NMFS, must determine such certification to be appropriate if established by information received in the public comment period.

1) A description of the reasons why the action by the agency is being considered.
For 2003, the Council sought a management strategy that would allow fishing to continue in areas and with gear that can harvest healthy stocks with little incidental catch of low abundance species. Recent stock assessments for bocaccio, yelloweye, canary and darkblotched rockfish, indicate that these species are in an overfished status (<25% of the virgin biomass). Therefore, measures must be taken to protect these stocks and rebuild them to sustainable biomass levels. The Council recommended that NMFS define additional management areas for the groundfish fishery that are based on bottom depth ranges where these overfished species are commonly found. For 2003, large-scale depth-related areas, referred to as groundfish conservation areas, will be used to restrict commercial and recreational fishing across much of

the continental shelf. Deep-water fisheries on the slope and nearshore fisheries will be permitted, but only in areas seaward or shoreward of the depth-based conservation areas.
The boundaries of the groundfish conservation areas are complex, involving hundreds of points of latitude and longitude to delineate nearshore and offshore fathom curves. The areas are vast, extending along the entire West Coast from Canada to Mexico, and the weather and sea conditions are frequently harsh. Some fishing such as midwater trawling for pelagic species and shrimp trawling providing finfish excluders are used, will be allowed to occur in the conservation areas. In addition, vessels intending to fish seaward of the westernmost boundary of a conservation area will be allowed to transit through the area providing the gear is properly stowed. Ensuring the integrity of conservation areas using traditional enforcement methods is especially difficult when the closed areas are large-scale and the lines defining the areas are irregular. Furthermore, when some gear types and target fishing are allowed in all or a portion of the conservation area while other fishing activities are prohibited it is difficult and costly to effectively enforce restrictions using traditional methods (air and surface craft surveillance, declaration requirements, landing inspections, and analysis of catch records and logbooks).

NMFS Guidance on RFA

NMFS has provided guidance as to how the regulatory flexibility analysis relates to other analyses and other applicable law. (source: "Operational Guidelines, Fishery Management Plan Process" National Marine Fisheries Service, Silver Spring MD, March 1, 1995, Appendix I.2.d.)

> "The RFA requires that the agency identify and consider alternatives that minimize the impacts of a regulation on small entities, but it does not require that the agency select the alternative with the least net cost. Section 606 of the RFA clearly states that the requirements of a regulatory flexibility analysis do not alter standards otherwise applicable by law. Executive Order 12866 requires that agencies provide an assessment of the potential costs and benefits of a "significant" action, including an explanation of the manner in which the regulatory action is consistent with a statutory mandate and, to the extent permitted by law, promotes the President's priorities and avoids undue interference with State, local, and tribal governments in the exercise of their governmental function (section 6(a)(3)(B)(ii)). However, the Executive Order also requires agencies to adhere to the requirements of the RFA and other applicable law (section 6(a)(3)). In short, when either the regulatory flexibility analysis or the RIR conflict with a statutory mandate (e.g., the Magnuson Act), the resulting decision must conform to the statute."

To allow for a more liberal depth-based management regime, as proposed by the Council for 2003, it was necessary to take action to establish a monitoring program to ensure the integrity of these large irregularly shaped depth-based conservation areas. NMFS has prepared regulations, at 50 CFR Part 660 subpart G, that require vessels registered to a Pacific Coast groundfish fishery limited entry permits to carry and use mobile Vessel Monitoring System (VMS) transceiver units while fishing in state and federal waters off the coasts of Washington, Oregon and California. This regulation will enhance monitoring of compliance with large-scale depth-based restrictions for fishing across much of the continental shelf. The regulations at 50 CFR 660 subpart G also require the operator of any vessel registered to a limited entry permit, and any other commercial or tribal vessel using trawl gear; including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber, to identify their intent to fish within restricted areas. These regulations further the conservation goals and objectives of the Pacific Coast Groundfish FMP by allowing fishing to continue in areas and with gears that can harvest healthy stocks with little incidental catch of low abundance species.

2) A succinct statement of the objectives of, and legal basis for, the proposed rule.

Ensuring the integrity of conservation areas using traditional enforcement methods (such as aerial surveillance, boarding at sea via patrol boats, landing inspections and documentary investigation) are especially difficult when the closed areas are large-scale and the lines defining the areas are irregular. Furthermore, when management measures allow some gear types and target fishing are allowed in all or a portion of the conservation area while other fishing activities are prohibited it is difficult and costly to

effectively enforce closures using traditional methods. Scarce State and Federal resources also limit the use of traditional enforcement methods. To allow for a more liberal depth-based management regime, as proposed by the Council for 2003, it is necessary to take action to establish a monitoring program to ensure the integrity of these large irregularly shaped depth-based conservation areas. This action is intended to create a monitoring program that will promote compliance with regulations that prohibit some fishing activities in conservation areas while allowing legal fishing activity that occurs within conservation areas to be effectively monitored.

The U.S. groundfish fisheries in state and federal waters off the Washington, Oregon, and California coasts are managed pursuant to the Magnuson- Stevens Act and the Pacific Coast Groundfish FMP. The FMP was developed by the Council. Regulations implementing the FMP appear at 50 CFR part 660 subpart G.

3) A description of and, where feasible, and estimate of the number of small entities to which the proposed rule will apply;

Any vessel registered to a limited entry permit that operates in state and federal waters off the states of Washington, Oregon or California must carry a NMFS OLE-approved mobile transceiver unit. Declaration report requirements apply to vessels registered to limited entry permits with trawl endorsements; any vessel using trawl gear, including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber; and any tribal vessel using trawl gear, before the vessel is used to fish in any trawl RCA or the CCA in a manner that is consistent with the requirements of the conservation areas (I.E pelagic trawl during when permitted for pelagic species such as yellowtail and widow rockfish or Pacific whiting; or pink shrimp gear with the required finfish excluder during the pink shrimp season). In addition, declaration reports will be required from vessels registered to limited entry permits with longline and pot endorsements, before the vessel can be used to fish in any Non-trawl RCA or the CCA, in a manner that is consistent with the requirements of those conservation areas (e.g. during the Dungeness crab or lobster fisheries).
The requirement to declare trips is applicable to 723, comprised of 424 limited entry vessels, 294 open access vessels, and 5 tribal vessels. The requirement to install and operate a VMS transceiver applies to 424 limited entry vessels, comprised of 257 trawl, 140 longline, 11 pot and 16 combined gear vessels. Except for the limited entry processing vessels in the at-sea whiting sector, all vessels affected by this action are assumed to have gross annual receipts of under $3.5 million and are defined as small entities under Section 601 of the Regulatory Flexibility Act.

Most vessels affected by this action have gross annual receipts of under $3.5 million and are defined as small entities under Section 601 of the Regulatory Flexibility Act, however, there are approximately 10 vessels defined as large entities operating in the limited trawl fishery. There could be some disproportionate economic impacts on small entities versus large entities for the group of limited trawl vessels that are less than 40 feet in length and have relatively low gross annual receipts. Depending upon the cost of the VMS, some of these smaller vessels would be forced to pay a relatively larger share of their annual expenditures for purchase of the VMS compared to the larger vessels. However, all vessels would increase their gross receipts by being able to fish in more productive areas, having the effect of increasing profitability and mitigating the cost of the VMS.

4) A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record.

Any vessel registered to a limited entry permit that operates in state and federal waters off the states of Washington, Oregon or California must carry a NMFS OLE-approved mobile transceiver unit. Vessels required to carry VMS transceiver units will provide installation/activation reports, hourly position reports, and exemption reports. The following reports are required for a VMS system to be effectively implemented:

> Installation/activation reports would require vessel owners and operators to follow a prescribed installation protocol and provide certain information about the installation to NMFS. An installation checklist would be issued by NMFS and the VMS installer would certify the information about the installation by signing a certification form and returning it to NMFS. Given that the VMS hardware and satellite communications services are provided by third parties, as approved by NMFS, there is a need for NMFS to collect information regarding the individual vessel's installation in order to ensure that automated position reports will be received. No special training or skills are necessary to prepare this report.
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> Hourly position reports are automatically transmitted by the VMS unit to NMFS via satellite once the VMS transceiver unit is installed and activated. Vessels that are required to have VMS must operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year, except when the vessel leaves state and federal waters of the west coast for an extended period. The number of annual transmissions depends on the VMS transceiver that the vessel owner purchases and the number of fishing days per year in the managed area. With many of the systems, there is a sleep function, when the vessel is in port, position transmissions are automatically reduced. This allows for port stays without significant power drain or power shutdown. When the vessel goes to sea, the unit restarts and normal position transmissions automatically resume. Because the unit in continuously operable, NMFS may query the unit at any time to obtain a position report.
>
> Exemption reports are optional, and would be sent by the vessel owner or operator because they wanted their vessel to be excused from the requirement to operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year. Such exemptions would only be allowed for vessels that will be operating seaward of the EEZ for more than 7 consecutive days or for vessels that will be continuously out of the water for more than 7 consecutive days. A vessel may be exempted from the requirement to operate the mobile transceiver unit continuously 24 hours a day throughout the calendar year if a valid exemption report, is received by NMFS, Office for Law Enforcement (OLE) and the vessel is in compliance with all conditions and requirements of the exemption. An exemption report would be valid until a second report was sent to cancel the exemption.

Declaration reports Vessels registered to limited entry permits with trawl endorsements; any vessel using trawl gear, including exempted gear used to take pink shrimp, spot and ridgeback prawns, California halibut and sea cucumber; and any tribal vessel using trawl gear, will be required to send a declaration report before the vessel is used to fish in any trawl RCA or the CCA in a manner that is consistent with the requirements of the conservation areas (I.E pelagic trawl during when permitted for pelagic species such as yellowtail and widow rockfish or Pacific whiting; or pink shrimp gear with the required finfish excluder during the pink shrimp season). In addition, declaration reports will be required from vessels registered to limited entry permits with longline and pot endorsements, before the vessel can be used to fish in any Non-trawl

RCA or the CCA, in a manner that is consistent with the requirements of those conservation areas (e.g. during the Dungeness crab or lobster fisheries). Each declaration report will be valid until cancelled or revised by the vessel operator. After a declaration report has been sent, the vessel cannot engage in any activity with gear that is inconsistent with that which can be used in the conservation area unless another declaration report is sent to cancel or change the previous declaration.

Declaration and exemption reports will be submitted by using an Interactive Voice Response (IVR) system . The IVR system, which is accessed by dialing a toll-free number, prompts the caller by asking a series of questions and allowing the caller to use the touch-tone telephone to respond. An IVR system allows vessels to quickly and easily submit their report 24 hours a and will reduce the paperwork burden on both the fisherman and the NMFS, as it makes it easier to collate the information submitted in the reports and monitor fishing activity. No special training or skills are necessary to prepare these reports.

5) An identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule.

No duplicative requirements that have been identified.

6) A summary of economic impacts. The vessels that would be most directly affected by the VMS requirement are the limited entry trawl, longline and pot vessels, and the exempted trawl vessels from the two open access classes. In section 4.3 of this document, 247 limited entry trawl vessels were estimated to earn an average of $180,000 exvessel revenue under the Council's 2003 depth-based management regime, as compared with the average $154,000 if the fishery were managed without the depth-based closures, this is a difference of $26,000 per vessel. Similarly, 197 limited entry longline and pot vessels were estimated to earn an average $96,000 in exvessel revenue under the Council's depth-based management regime, as compared with an average of $82,000 if the fishery were managed without depth-based management, a difference of $14,000 per vessel. The difference in average revenues for the two classes of open access groundfish vessels is less, but still significant: $7,000 for the 516 vessels with less than 5% of revenue from groundfish, and $3,000 for the 771 vessels with more than 5% of revenue from groundfish.

While exvessel revenues appear higher on average for vessels likely to be required to use VMS under the depth-based management regime, it should be noted that non-VMS fishing costs may also be higher, offsetting some of the apparent gain. Unfortunately vessel cost data necessary to estimate this effect are not currently available. It is also important to keep in mind that using average revenues masks the variability of ex-vessel revenues in each vessel class. While on average, additional revenues appear greater than VMS-related costs, for some individual vessels in each class this will not be the case.

The average per vessel costs of adopting VMS under Monitoring System Alternative 3 range from $2,163 to $5,623 in the first year, and from $548 to $1,698 each subsequent year. Similarly under Monitoring System Alternative 4, VMS-related costs range from $3,878 to $7,607 in the first year, and from $1,063 to $2,342 each subsequent year. Comparing these per vessel average cost estimates with the average revenue gains derived above indicates that on average, and depending on how other non-VMS costs are affected, most vessels could potentially be better off with depth-based management, including VMS related costs, than under the likely alternative management regime. The obvious exception would be Open Access vessels with more than 5% of revenue from groundfish. Under most of the alternatives, the first year VMS-related costs would apparently outweigh the expected average benefit for these vessels (although once VMS is installed, in subsequent years, the annual operating, maintenance and replacement costs would generally be less than average additional revenues).

7) A description of any alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimizes and significant economic impacts of the proposed rule on small entities.

The defined objective of this proposed rulemaking is to ensure the integrity of groundfish conservation areas. To accomplish this three different approaches for a monitoring system were analyzed: a declaration system, a VMS monitoring program, and fishery Observers. In addition, the sectors of the groundfish fleet that would be required to have a VMS or observers and the distribution of costs between NMFS and the fishing industry for a monitoring system were analyzed. After considering the alternatives, the Council and NMFS determined that a VMS monitoring program was the alternative that best accomplished the defined objectives.

Two approaches to VMS were considered: a Basic VMS system and an Upgraded VMS system. The primary difference between the two alternative action was that the upgraded system uses two-way communications between the vessel and shore such that full or compressed data messages can be transmitted and received by the vessel, while the basic system only transmits positions to a shore station. It was determined that basic system was the minimum system that accomplished the stated objectives.

Most of the affected entities qualify as small businesses. As the rule was developed the burden on fishery participant was considered and changes were made to the reporting requirements ,so only the minimum data needed to monitor compliance with regulations are being required.

The VMS units that have been type-approved for this fishery range in costs and service features. This allows the vessel owner the flexibility in choosing the model that best fits the needs of their vessel. Vessel that have already purchased VMS transceiver units for other fisheries or personal purposes have been given consideration. Vessels will be allowed to retain existing VMS transceivers providing they are on the list of type-approved models and have been upgraded to the level required for the fishery.

The Submission of declaration reports were initially proposed as per trip report. Following consultation with fishery participants, it was determined that the needs of NMFS OLE and the USCG could be met with less frequently made declaration reports. Therefore, it was determined that a declaration report identifying the type of gear being used by a vessel would remain valid until cancelled or revised by the vessel operator. This results in a significant reduction in the number of reports.

Following consultation with fishery participants, it was determined that some vessels may prefer to reduce the costs of reporting when leaving state and federal waters off the coasts of Washington, Oregon, and California. Because a substantial number of permitted vessels also fish in waters off Alaska and in areas seaward of the EEZ, and because vessels are commonly pulled out of the water for extended periods, a VMS hourly report exemption option was added, which included an exemption report.

7.0 List of Preparers

This document was prepared by the Northwest Regional Office of the NMFS. Contributors from the NMFS: Becky Renko, lead and primary author; Yvonne derReynier, Carrie Nordeen, Jamie Goen. Ed Waters of the Pacific Fishery Management Council provided the analysis of the expected economic effects of the fishery participants. Steven Springer of the National Marine Fisheries Service Office for Law Enforcement provided provide technical information on VMS system and costs. Will Daspit, of the Pacific States Marine Fish Commission who provided PacFin data used in the analysis.

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9.0 Acronyms and Glossary of Terms

ABC (Acceptable biological catch) The allowable catch for a species or species group, based on its estimated abundance. The ABC is used to set the upper limit of the annual total allowable catch and is calculated by applying the estimated or proxy harvest rate that produces maximum sustainable yield to the estimated exploitable stock biomass.

B0 Unfished biomass; the estimated size of a fish stock at equilibrium in the absence of fishing.

B25% 25% of unfished biomass. This is the Council's threshold for declaring a stock overfished or the Minimum Stock Size Threshold.

B40% 40% of unfished biomass. This is the Council's threshold for declaring a stock rebuilt or the size of the stock estimated to produce MSY. This is also referred to as BMSY.

Biological opinion (BO) A scientific assessment issued by the National Marine Fisheries Service, as required by the Endangered Species Act for listed species.

Biomass The total weight of a group (or stock) of fish. The term biomass means total biomass (age one and above) unless stated otherwise.

Bycatch Fish which are harvested in a fishery, but which are returned to the sea rather than being sold, kept for personal use, or donated to a charitable organization. Bycatch + landed catch = total catch or total estimated fishing-related mortality.

California Bight The region of concave coastline off Southern California between the headland at Point Conception and the U.S./Mexican border, and encompassing various islands, shallow banks, basins and troughs extending from the coast roughly 200 km offshore.

CCA (Cowcod Conservation Area) Two areas located in the Southern California Bight southwest of Santa Monica to the California-Mexico border that encompass roughly 4,300 nm2 of habitat where the highest densities of cowcod occur. These areas are closed to bottom fishing in order to rebuild the cowcod stock to BMSY.

CDFG California Department of Fish and Game

Cetaceans Marine mammals of the order *Cetacea*. Includes whales, dolphins and porpoises.

CFR (Code of Federal Regulations). A codification of the regulations published in the *Federal Register* by the executive departments and agencies of the federal government. The CFR is divided into 50 titles that represent broad areas subject to federal regulation. Title 50 contains wildlife and fisheries regulations.

Coastal pelagic species. Coastal pelagic species are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. They are usually planktivorous (plankton-eating) and the main forage of higher level predators such as tuna, salmon, most groundfish, and man. Examples are herring, squid, anchovy, sardine, and mackerel.

Commercial fishing. Fishing in which the fish harvested, either whole or in part, are intended to enter commerce through sale, barter, or trade.

Cumulative limit. The total allowable amount of a species or species group, by weight, that a vessel may take and retain, possess, or land during a period of time. Fishers may take as many landings of a species or species complex as they like as long as they do not exceed the cumulative limit that applies to the vessel or permit during the designated period.

CZMA (Coastal Zone Management Act) An act of federal law with the main objective to encourage and assist states in developing coastal zone management programs, to coordinate state activities, and to safeguard regional and national interests in the coastal zone.

Demersal Living in close relation with the sea floor.

Density dependence The degree to which recruitment changes as spawning biomass changes.

DTS Dover sole/thornyhead/trawl-caught sablefish complex

EEZ (Exclusive economic zone). A zone under national jurisdiction (up to 200-nautical miles wide) declared in line with the provisions of the 1982 United Nations Convention of the Law of the Sea, within which the coastal State has the right to explore and exploit, and the responsibility to conserve and manage, the living and non-living resources.

EFH (Essential fish habitat). Those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.

Environmental assessment As part of the National Environmental Policy Act (NEPA) process, an EA is a concise public document that provides evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact.

Environmental impact statement As part of the National Environmental Policy Act (NEPA) process, an EIS is an analysis of the expected impacts resulting from the implementation of a fisheries management or development plan (or some other proposed action) on the environment. EISs are required for all fishery management plans as well as significant amendments to existing plans. The purpose of an EIS is to ensure that the fishery management plan gives appropriate consideration to environmental values in order to prevent harm to the environment.

E.O. 12866 A Federal executive order that, among other things, requires agencies to assess the economic costs and benefits of all regulatory proposals and complete a Regulatory Impact Analysis (RIA) that describes the costs and benefits of the proposed rule and alternative approaches, and justifies the chosen approach. See RIR.

E.O. Executive Order

ESA (Endangered Species Act) An act of federal law that provides for the conservation of endangered and threatened species of fish, wildlife, and plants. When preparing fishery management plans, councils are required to consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to determine whether the fishing under a fishery management plan is likely to jeopardize the continued existence of an ESA-listed species, or to result in harm to its critical habitat.

Exploitable biomass The biomass that is available to a unit of fishing effort. Defined as the sum of the population biomass at age (calculated as the mean within the fishing year) multiplied by the age-specific

availability to the fishery. Exploitable biomass is equivalent to the catch biomass divided by the instantaneous fishing mortality rate.

Federal Register The *Federal Register* is the official daily publication for Rules, Proposed Rules, and Notices of Federal agencies and organizations, as well as Executive Orders and other Presidential documents. Fisheries regulations are not considered final until they are published in the *Federal Register*.

Fish stock A population of a species of fish from which catches are taken in a fishery. Use of the term "fish stock" usually implies that the particular population is more or less isolated from other stocks of the same species, and hence self-sustaining.

Fishing community A community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs. Includes fishing vessel owners, fishing families, operators, crew, recreational fishers, fish processors, gear suppliers, and others in the community who depend on fishing.

Fishing year January 1 through December 31.

Fixed gear Fishing gear that is stationary after it is deployed (unlike trawl or troll gear which is moving when it is actively fishing). Within the context of the limited entry fleet, "fixed gear" means longline and fishpot (trap) gear. Within the context of the entire groundfish fishery, fixed gear includes longline, fishpot, and any other gear that is anchored at least at one end.

FM (Fathom) Six feet.

FMP (Fishery management plan) A plan, and its amendments, that contains measures for conserving and managing specific fisheries and fish stocks.

(*GPS) Global Positioning Systems* GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time.

(GAP) Groundfish Advisory Subpanel The Council established the GAP to obtain the input of the people most affected by, or interested in, the management of the groundfish fishery. This advisory body is made up of representatives with recreational, trawl, fixed gear, open access, tribal, environmental, and processor interests. Their advice is solicited when preparing fishery management plans, reviewing plans before sending them to the Secretary, and reviewing the effectiveness of plans once they are in operation.

GMT (Groundfish Management Team) Groundfish management plans are prepared by the Council's GMT, which consists of scientists and managers with specific technical knowledge of the groundfish fishery

HMS (Highly migratory species) In the Council context, highly migratory species in the Pacific Ocean include species managed under the HMS Fishery Management Plan: tunas, sharks, billfish/swordfish, and dorado or dolphinfish.

Incidental catch or incidental species Groundfish species caught when fishing for the primary purpose of catching a different species.

IPHC (International Pacific Halibut Commission) A Commission responsible for studying halibut stocks and the halibut fishery. The IPHC makes proposals to the U.S. and Canada concerning the regulation of the halibut fishery.

IRFA (Initial regulatory flexibility analysis) An analysis required by the Regulatory Flexibility Act.

Limited entry fishery A fishery for which a fixed number of permits have been issued in order to limit participation.

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) established the 200 nm fishery conservation zone (EEZ), the regional fishery management council system, and the process and mandates for regulating marine fisheries in the EEZ.

Marine Recreational Fisheries Statistical Survey (MRFSS) A national survey conducted by National Marine Fisheries Service to estimate the impact of recreational fishing on marine resources.

MMPA (Marine Mammal Protection Act) The MMPA prohibits the harvest or harassment of marine mammals, although permits for incidental take of marine mammals while commercial fishing may be issued subject to regulation.

MSY (Maximum sustainable yield) An estimate of the largest average annual catch or yield that can be continuously taken over a long period from a stock under prevailing ecological and environmental conditions.

Mt (Metric ton) 2,204.62 pounds.

National Environmental Policy Act (NEPA) Passed by Congress in 1969, NEPA requires Federal agencies to consider the environment when making decisions regarding their programs. Section 102(2)(C) requires Federal agencies to prepare an Environmental Impact Statement (EIS) before taking major Federal actions that may significantly affect the quality of the human environment.

National Marine Fisheries Service (NMFS) A division of the U.S. Department of Commerce, National Ocean and Atmospheric Administration (NOAA). NMFS is responsible for conservation and management of offshore fisheries (and inland salmon). The NMFS Regional Director is a voting member of the Council.

NAO NOAA Administrative Order

Neritic Inhabiting coastal waters primarily over the continental shelf, generally over bottom depths equal to or less than 183 meters (100 fm) deep.

Oceanic Inhabiting the open sea, ranging beyond the continental and insular shelves, beyond the neritic zone.

ODFW Oregon Department of Fish and Wildlife

Office of law Enforcement (OLE) the National Marine Fishery Service, Office of Enforcement, Northwest Division

OMB Office of Management and Budget

Open-access fishery The segment of the groundfish fishery or any other fishery for which entry is not controlled by a limited entry permitting program.

Overfished The term generally describes any stock or stock complex determined to be below its overfished/rebuilding threshold. The default proxy is generally 25% of its estimated unfished biomass; however, other scientifically valid values are also authorized.

Overfishing Fishing at a rate or level that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. More specifically, overfishing is defined as exceeding a maximum allowable fishing mortality rate (or the MFMT). For any groundfish stock or stock complex, the maximum allowable mortality rate will be set at a level not to exceed the corresponding MSY rate (FMSY) or its proxy (e.g., F35%).

Optimum yield (OY) The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems. The OY is developed on the basis of the Maximum Sustained Yield from the fishery, taking into account relevant economic, social, and ecological factors. In the case of overfished fisheries, the OY provides for rebuilding to a level that is consistent with producing the Maximum Sustained Yield for the fishery and is typically a prescribed harvest level less than the ABC.

PacFIN Pacific Coast Fisheries Information Network. A database managed by the Pacific States Marine Fisheries Commission that provides commercial fishery information for Washington, Oregon, and California.

Pelagic Inhabiting the water column as opposed to being associated with the sea floor; generally occurring anywhere from the surface to 1000 meters (547 fm)..

Potential biological removal (PBR) The maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

PRA Paperwork Reduction Act

Processing The preparation or packaging of fish to render it suitable for human consumption, retail sale, industrial uses, or long-term storage, including but not limited to cooking, canning, smoking, salting, drying, filleting, freezing, or rendering into meal or oil, but not heading and gutting unless additional preparation is done.

RCA Rockfish Conservation Area

Rebuilding Implementing management measures that increase a fish stock to its target size.

RecFin Recreational Fishery Information Network. A database managed by the Pacific States Marine Fisheries Commission that provides recreational fishery information for Washington, Oregon, and California.

Regulatory Flexibility Analysis or Regulatory Impact Review (RIR) Anytime an agency publishes a notice of proposed rule making, an RFA is required. It describes the action, why it is necessary, the objectives and legal basis for the action, a description of who will be impacted by the action, and a description of the

projected reporting, record-keeping, and other compliance requirements of the proposed rule. The types of entities subject to the rule, and the professional skills required to prepare the report or record, must also be described.

Stock Assessment and Fishery Evaluation (SAFE) a document prepared by the Council that provides a summary of the most recent biological condition of species in the fishery management unit, and the social and economic condition of the recreational and commercial fishing industries, including the fish processing sector.

Target fishing is fishing for the primary purpose of catching a particular species or species group.

U and A Usual and accustomed

USCG U.S. Coast Guard

USFWS U.S. Fish and Wildlife Service

VMS Vessel monitoring system

WDFW Washington Department of Fish and Wildlife

WOC Washington, Oregon, California

YRCA Yelloweye Rockfish Conservation Area

Appendix A

VMS standards
(March 31, 1994: 59 FR 151180)

DRAFT